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THE PLANNING AND CONSTRUCTION OF LOUISIANA SCHOOL BUILDINGS.

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THIS REPORT REPRESENTS A GENERALIZED ANALYSIS OF FACTORS RELATED TO PLANNING AND BUILDING STATE SCHOOLS. THE FIRST SURVEY PHASE IS USED FOR DETERMINATION OF EDUCATIONAL NEEDS AND PROGRAMS. THE RELATIONSHIPS OF THE SCHOOL BOARD TO THE ARCHITECT AS WELL AS PUBLIC SUPPORT AND FINANCE CRITERIA ARE EXPLAINED IN THIS CHAPTER. SITE SELECTION AND DEVELOPMENT ARE ANALYZED IN TERMS OF PHYSICAL FACTORS AND GENERAL PRINCIPLES, WHILE BUILDINGS ARE STUDIED ACCORDING TO--(1) ARCHITECTURAL FACTORS, (2) CONSTRUCTION DETAILS, AND (3) INSURANCE RATING. SCHOOL ROOM ANALYSIS RELATES TO--(1) CLASSROOMS, (2) SPECIALIZED AREAS, AND (3) AREAS OF COMMON USAGE. IMPLEMENTATION OF SERVICE SYSTEMS AND SAFETY PRECAUTIONS, AS WELL AS RECOMMENDATIONS FOR DUAL USE FALLOUT SHELTERS, ARE DISCUSSED IN SEPARATE CHAPTERS. SPECIALIZED EQUIPMENT FOR VARIOUS EDUCATIONAL FUNCTIONS IS ALSO ANALYZED IN TERMS OF ELEMENTARY AND SECONDARY SCHOOLS. (MH)

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Director, School Housing

Issued by
STATE DEPARTMENT OF PUBLIC EDUCATION
William J. Dodd, *Superintendent*

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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ACKNOWLEDGMENT

The Handbook, THE PLANNING AND CONSTRUCTION OF LOUISIANA SCHOOL BUILDINGS, was first compiled in 1954 as a service to local parish and city school boards. It represents the planning, knowledge, and inspirings of many people interested in the development of school buildings.

This publication was prepared by a state-wide committee with membership from professional and lay organizations. The committee designated to prepare the report was composed of the following members: architects, principals, visiting teachers, teachers, laymen, the State Board of Health, the State Fire Marshal, the Liquefied Petroleum Gas Commission, members of the State Department of Education, Dr. John Hunter, H. A. Norton, O. W. Broussard, George Cousin, J. R. Gormley, W. E. Pate, Ulrick Hackett, Judson Shows, R. G. Hanchey, K. R. Hanchey, L. H. Richard, G. Lewis Dunn, J. B. Thompson, W. A. Smith, John D. Green, M. M. Walsworth, W. B. Glover, H. H. Moorman, E. D. Schneider, Bailey Martin, L. H. Cook, L. V. De Cou, L. H. Willis, Mrs. Lucille Woolridge, Mrs. Verlie Heard, B. F. Barron, H. A. Bateman, P. B. Mangum, M. D. Peel, Paul J. Neal, Walter Enete, C. C. Murphy, H. H. Land, R. H. White, Marvin Bass, Edward F. Neild, Seymour Van Os, J. H. Duncan, Lloyd L. Waite, V. M. Robert, J. E. Pitcher, R. V. Kerr, F. C. Haley, J. A. Shelby, T. O. Rusheon, L. C. Curry, H. W. Chandler, J. L. Cathcart, L. P. Terrebonne, Watson Bankston, Ralph Bodman, M. J. Israel, C. M. Jones, James Plummer, Hugh Wall, Mrs. Pearl Miller, Mrs. Josie Garrett, J. L. Stirling, P. H. Dupuy, W. E. Butler, E. L. Roussel, Patrick Olinde, L. W. Higgins, E. O. Daigle, Jack Pizzano, Floyd R. Roy, Albert J. Peyregne, Ervin L. Granier, E. J. Landry, Vergie Lee Stringer, Hilda Theard, William R. Burk, John H. O'Neill, C. E. Ammen, K. E. Jones, F. H. Shiel, Morgan Walker, H. L. Graham, Robert Scott, C. Errol Barron, S. M. Brister, Curtis Cook, E. H. Aiken, H. O. Schwartz, E. S. Aiken, Lolita Guilbeau, Hardtner Huffman, T. L. Johnston, C. C. Belgard, A. J. Cormier, G. P. Lucas, F.

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As a result of numerous changes in state laws and in regulations of various state agencies concerned with schoolhouse construction, it was consensus of opinion of school administrators that a revised edition of Bulletin No. 711, THE PLANNING AND CONSTRUCTION OF LOUISIANA SCHOOL BUILDINGS, should be prepared.

The committee which assumed this responsibility and prepared the revision consisted of the following members: Dr. J. Berton Gremillion, Normand Edwards, Henry B. Dunlap, James E. Roembke, H. A. Norton, Dr. Gladys Peck, Charles E. Bishop, Jr., Harvey Gardiner, W. E. Pate, H. O. Thomas, Lela A. Tomlinson, Lula Mae Carroll, Evelyn Terrell, C. P. McVea, C. W. Eubanks, L. W. Ferguson, Dr. Lena deGrummond, William Noonan, Jr., Irma S. Willard, Howard McCollum, Dr. Edward Hermann, A. B. Davis, Raphiel Teagle, Dr. O. B. Fuglaar, C. E. Ammen, F. C. Delana, H. J. Bergeron, M. M. Walsworth, C. C. Belgard, K. R. Hanchey, and L. L. Waite.

The committee recognized the fact that School Boards of Louisiana have obligations to provide necessary classrooms and auxiliary buildings with a limited amount of money available from local tax sources. Therefore, the recommendations found in this Handbook stress a safe, functional building, economically constructed, placed on an adequate site, and readily accessible to the pupil population.

If the Handbook proves of value to Louisiana School Boards, all credit is due the committee members who gave generously of their time in an effort to bring to you modern trends applicable to Louisiana schools.

C. E. HOLLY,
Director
School Housing

CHAPTER ONE

I. The Survey

To Determine Educational Program to Be Offered

Effective planning demands recognition of the educational needs of the particular community, locality, or school area in accordance with the commercial, cultural, and industrial environment of the community. A careful analysis of these needs should be included in the planning of a building program.

An analysis of immediate and future needs relative to school plant facilities may best be determined by a comprehensive survey. The survey should provide information and facts that will contribute to the forming of concrete conclusions regarding building needs.

Because of space limitations, this survey outline is presented in rather general terms. It is hoped that such an outline may be helpful and that it may be adapted to the size of the community, the complexity of local problems, and other local conditioning factors.

A. Nature of Community

1. What is the child population? the age grouping? the per cent attending public schools? the per cent not in school?
   (Parish Health Unit birth record tabulations furnish a means of predicting future pupil enrollment for school districts.)
2. What are the possibilities for consolidation?
3. What is the nature of the general population? the social composition, stability, population trends, age groupings, population density, etc.?
4. What is the commercial, the cultural, and the industrial life?
5. What are the occupational diversities? the trends toward industrial expansion or other fluctuations?
6. What is the history of the community in regard

to general growth? public school organization and growth?

7. What are the possibilities of expansion or contraction of population?

B. The Educational Program

1. What should be the extent of the school program? the number of grades—twelve, or more?
2. How should the educational program be organized? K-6-3-3, K-6-6, 8-4, etc.?
3. What may be the possible changes in the program with regard to including younger children or additional grades?
4. What changes may be anticipated for adding or discontinuing courses in special fields? in industrial arts, vocational agriculture, distributive education, etc.?
5. What should be the pupil-teacher ratio in various phases of the program?
6. What are the desirable trends in elementary education?
7. What are the desirable trends in secondary education?

To Determine School Building and Site Needs, in The Light of the Proposed Educational Program

A. Survey of Present Plant

When it becomes evident that the present school plant is no longer adequate to meet the current and contemplated educational needs of the community, the time has arrived for the inauguration of a new building program or a program of expansion. The extent to which the present plant does and does not (in terms of sound educational and financial economy) meet the needs of the community must be determined by analyzing and interpreting certain facts gathered from the community and the school. The study should attempt to answer at least the following questions:

1. Sites

   Are present sites adequate as to size, topography, and freedom from physical and moral hazards?
   Are sites accessible to pupil population?
   Do sites insure clean air, sunshine, and a minimum of disturbing noises?
   Are physical surroundings such that the site may be increased in size if it is found that more space is needed?

2. Buildings

   Is the present building fully utilized?
   Is the building adapted to the current or the contemplated educational program?
   Is the present plant economical to operate?
   Is the building such that it can be satisfactorily and economically enlarged and renovated so that it will properly house the educational program contemplated for the community?
   Is the present building such that it will be architecturally sound and economically justifiable to permit of enlargement?

   Can the proposed educational program for the community be more efficiently housed in one large building than in several smaller ones?
   Do population trends in the school community indicate that there will be a large increase in pupil enrollment within the next five or ten years?

Certainly there is no justification for the construction of new buildings if the present plant can be renovated and enlarged so as to be satisfactory from the standpoint of educational, architectural, structural, and economic soundness. Authorities should consider the higher maintenance and operational cost, the capitalized cost of a renovated and enlarged old building, and the anticipated educational advantages therefrom. These points should be carefully weighed against the lower maintenance and operational cost and the capitalized cost of a new building, together with the anticipated educational advantages. If such comparisons are carefully studied and properly weighed, they should be of value in arriving at a decision as to whether to renovate and enlarge old buildings or construct new ones.

B. Determining Future Building Needs

1. Population trends as to numbers and areas under development

   It is highly desirable to study building permits, real estate developments, information from gas, water, and electric utility companies, and the surveys of population trends as made by telephone companies. These sources furnish fairly reliable information which may be used as a basis for the prediction of future development in a given area.

2. Changes in the educational program and organization

   Possible changes in the school program and all curtailments and extensions (including community enterprises, adult education, community library services, and community recreational activities) should be considered seriously in planning a school building program. Buildings should house not only pupils and faculty but also programs and activities of varied character that are of importance to a progressive community. The plant should be planned with the paramount idea in mind of building a structure or structures that will as nearly as possible meet all the educational needs of the surrounding area.

To Determine Financial Ability of District to Remodel and to Construct New Building as Needed

In determining the financial ability of a school district to remodel or construct new buildings, the following factors should be considered:

1. Assessed evaluation of taxable property in the district

2. Present bonded indebtedness
3. Building taxes presently in force
4. Bonds, other than school bonds, outstanding
5. Schedule of bond payments
6. Percentage of property subject to homestead exemption
7. Extent of industrial development in district

Because the total of all school bonds issued within a school district cannot at any time exceed the constitutional limitation of 25 per cent of the assessed evaluation of the taxable property within the district, a knowledge of the total property assessment and the amount of school bonds presently outstanding is necessary to determine the maximum bond issue possible. Under normal conditions this maximum might well be taken as the measure of the district's ability to finance the building program. It is possible, however, that an excessive burden of taxation might result from voting the maximum bond issue possible within certain districts. This fact can be ascertained only from a thorough analysis of the effects of the above-mentioned factors (the building and improvement taxes now in force, the bonds other than school bonds outstanding, the percentage of property subject to homestead exemption, and the extent of industrial development) on the ability of the district to assume an additional tax burden.

Under the present system of establishing school districts and providing funds for school building purposes, some districts will find that revenues available for financing needed building programs are entirely inadequate, even after passage of the maximum bond issue possible within the district. In some parishes the establishing of a parish-wide bond district in lieu of several smaller districts might serve to alleviate this condition as well as to better equalize educational facilities within the parish. Such a plan should be especially helpful in those parishes in which there exists a great inequality in the distribution of the taxable wealth in proportion to the population to be educated.

With an ever-growing need for more and better school buildings, few parishes are able to meet completely their building needs with the financial resources presently available to them. This fact is strongly indicative of the need for a sound plan of state or federal assistance in providing adequate funds for essential school building construction.

Federal Assistance for Fallout Shelter Spaces

Financial assistance may be available for the inclusion of fallout shelter space in school plants. Information should be requested from your local or state CD office.

Federal Legislation for this program expected during FY 1964.

II. Preliminary Planning

Selecting the Architect

A clear understanding of the services to be rendered by the architect and his potential contribution to the building program will aid the Board in making its selection.

The architect's professional services consist of the necessary conferences; the preparation of preliminary studies, preliminary estimates, working drawings, specifications, and large-scale and full-sized detail drawings; the structural and mechanical design for the working drawings and specifications; the drafting of forms of proposals; the taking of bids and preparation of contracts; the checking of shop drawings; the inspection of models; the checking of materials submitted for approval and proposed use in the structure; the issuance of certificates of payments; the keeping of accounts; the checking of bonds, executed guarantees, etc.; the general administration of the business; and supervision of the work.

The matter of fee should be ruled out as a basis of selection. Architects generally conform to the standard fee recommendation of the American Institute of Architects.

The following considerations for selection of an architect will be helpful:

1. Is he legally qualified and in good standing in his profession?

2. Is he affiliated with a recognized professional association? (either A.I.A. or the State Architect's Association)
3. Does his record indicate ability to budget properly funds for a given project? In other words, are his projects constructed at a cost reasonably close to his preliminary estimates?
4. Are his designs, school or other, indicative of an interest in advanced methods of planning and construction?
5. Does his past record indicate a co-operative attitude toward his clients?
6. Has he shown an interest in school buildings to the extent that he considers them a specialized phase of architectural practice, i.e., has he attended seminars or similar meetings dealing with school planning? Has he made use of the specialized planning talent supplied by the State Department of Education? Can he fluently discuss pertinent rules concerning fire and health regulations of the state and the city?
7. Is his organization, office staff, location, and financial condition such that the planning of facilities can proceed on a time schedule approximate to the plant needs of the district?

Contract Between Architect and School Board

Having selected an architect, it is advisable that the School Board enter into a contract agreement with him, relating in detail the services which he is to perform and the compensation which he will receive for his work.

The American Institute of Architects has developed a "Standard Form of Agreement" which is recommended as a basis of such contracts. It is possible that some modifications are necessary to fit local conditions. If it is necessary to divert from the Standard Form, expert legal authorities should be consulted. The district attorney in any area will give such advice without charge to the School Board.

In general, the contract covers the items as described below:

1. The architect agrees to perform all the professional services necessary for the development of the project to the satisfaction of the owner. *Note:* If other professional services are performed (such as engineering work by other firms), it shall be so stated in the contract.
2. Definite dates are established for the submission of preliminary studies, drawings, cost estimates, and progress schedules. Also, definite dates are established for the completion and submission of working drawings and specifications.
3. The general professional work of the architect is covered, as mentioned hereinbefore, under the heading of "Selecting the Architect."
4. The contract covers the extent and type of supervision required of the architect during the construction of the building as well as his responsibility for issuing certificates for payment, checking and approving bills and estimates, and other clerical and accounting work which may be necessary or incidental to the prosecution of the project.
5. Fees to be paid the architect are covered in detail.
6. The contract covers procedure in case of abandonment of the project or termination of the architect's services, stating the equitable amount of compensation to be paid the architect for only partially completed work.
7. Type of compensation due the architect for extra expenses involved in increases in the amount of work done through no fault of his own is covered.
8. The contract covers certain information which the owner shall furnish the architect, such as complete and accurate surveys of the building site and all data with references to rights, restrictions, easements, boundaries, etc.

It is very difficult to write into the agreement all the services actually performed by the architect, but if the

Standard Form of Agreement is adhered to, there will be little chance for conflict between a good architect and the School Board relative to the status of either.

Additional Consultants

If shelter space is a consideration, the architect can obtain the services of a Fallout Shelter Analyst to consult in the initial and final planning and design.

When to Employ the Architect

Because of his ability to provide pertinent advice and counsel in all matters of planning, the architect should be employed at an early stage in the building program, certainly no later than the completion of the educational survey. If the survey suggests the problem of remodeling, renovating, or enlarging existing buildings, the architect should be brought into the picture at that time. If location of sites for new buildings is to be included in the survey, the architect should be consulted as he is quite often familiar with building trends, anticipated subdivision construction, or other development that might affect population trends in certain areas. His advice in regard to drainage, topography hazards, etc., is also required.

The School Board should not delay in employing the architect. If his employment is deferred until the budget is set or until definite ideas or types of buildings are adopted, the full use of his services and talents cannot be made.

It is a waste of talent and money to employ a competent architect to do a job for which he is especially trained and then fail to set up procedures that will enable him to render the service for which he is paid. A glaring instance of this occurs when the school officials, playing amateur architect, give the architect an outline sketch and tell him to develop plans and specifications from it.

The competent architect is aware of the great interest of school officials in successful planning and is eager to obtain ideas from any source. He will certainly listen to and be guided by any usable ideas available. It should be

remembered that one of the qualifications that influences his employment over others is his ability to cooperate and work in harmony with staff members of the School Board.

Preliminary Plan and Cost Estimate

A. Information Required by the Architect

It is essential that the architect have a definite program for development. He must have detailed information on the actual requirements of the school to be housed, including the following basic data:

1. ***Regular classroom requirements.*** **He must be furnished with either a specific number of classrooms and the sizes desired or a specific number of students to be housed.**
2. ***Special classroom requirements.*** **He must have information as to special classroom requirements and their exact usages. Under this heading come various types of laboratories, commercial departments, primary departments, music and band rooms, libraries, home economics departments, manual arts shops, and other rooms for vocational activities. He must know the student load of all these special areas.**
3. ***General assembly requirements.*** **Will an assembly room be required and, if so, will it be for full student-body assembly, for community use, or merely a work room for the teaching of dramatics, speech, etc.?**
4. ***Service room requirements.*** **Detailed information should be given with reference to the necessary office space, book storage, janitors' storage, supply rooms, teachers' rooms, toilets, kitchens, lunchrooms, physical examination rooms, furnace rooms, etc.**
5. ***Lunchroom and kitchen requirements.*** **A careful estimate should be provided of the number of meals to be served at one sitting, the total number of meals to be served, and the time allot-**

ment for serving. (With these essential data, the State Department of Education is able to co-operate very closely with the development of adequate lunchroom and kitchen plans.)

6. *Unloading and entrance requirements.* It is necessary to plan for adequate bus unloading facilities and for all-weather entrances.
7. *Physical education requirements.* What physical education facilities, such as gymnasium, playing fields, etc., are necessary? Are they for both boys and girls or for one sex only?
8. *Approach and landscape requirements.* What approach, drives, walks, landscapes, etc., are essential or desired?
9. *Special mechanical requirements.* Details of the special mechanical work required (such as loudspeaker systems, outside lighting, etc.) should be furnished.
10. *Definite site information.* Definite site information (such as topographical map, utility map, building restrictions, and any other pertinent information) should be supplied the architect.

All the above information should be in writing, and all discussions concerning these matters should be in writing.

B. Architect's Duties at Preliminary Stage

Although the actual development of the plan studies is not a part of this discussion, the architect will take the basic elements supplied him (as listed above), and arrange them to the best advantage, with the consideration for such problems as interrelations of various departments, orientation of various elements, solution of circulation problems (both within and without the structure), and relation of the building to existing contours or peculiarities of the site or location.

1. Preliminary drawings

From his studies of the information and data submitted, the architect will supply the School Board with a set of preliminary drawings. These drawings should consist of floor plan, site plan, elevation drawings, and a perspective drawing of the building.

2. Outline of specifications

   The architect will also supply the School Board with an outline specification. This specification will cover the type of construction to be used, including not only the basic structure (such as the type of walls, floors, and roof structure) but also the general type of finish to be incorporated into the final plans and specifications. It will also outline the type of heating plant and define clearly the type and level of lighting to be used. It will cover any special mechanical work, such as the intercommunication system and special requirements for shops, home economics departments, laboratories, etc.

3. Preliminary estimate of cost

   The next step of the architect is to prepare and submit a preliminary estimate of the cost of the construction work in order that the proper amount of funds may be budgeted for the project. This estimate is a very important part of the architect's work, and a competent architect will spend considerable time at this work so as to arrive at a budget that will approximate the true cost of the project. The preliminary estimate is also one of the most difficult things that the architect attempts, since he must arrive at a satisfactory estimate without the benefit of complete plans and specifications. However, he is trained in this type of work and can arrive at a fair estimate, provided the preliminary plans are thoroughly worked out and have been based on complete information regarding requirements. It is well at this point to stress the fact that preliminary plans and specifications should not be hurried, nor should basic decisions on the type of structure or general requirements be haphazardly determined. It should be remembered that when the architect has completed the preliminary work he has earned 25 per cent of his fee. It should be further remembered that when the preliminary drawings are complete the entire pattern and possible use of the building is fixed; and (from the standpoint of planning) it is either good, mediocre, or bad at this stage. If the requirements have not been thoroughly diagnosed or the architect has not arrived at a workable solution, no amount of finish work at this stage can produce a successful building.

III. Analysis and Revision of Preliminary Plans and Agreement on Scope of Work

After the preliminary plans and the cost estimate for the building or buildings have been made, these plans should be carefully analyzed to be sure that the construction comes as near filling the needs of the school and community as possible. This re-examination of the preliminary plans will lead to efficiency and should reduce the building costs. Of course, the educational program for the child should be kept uppermost in the minds of those responsible for buildings and equipment.

Since building is so expensive, the simple style (well appointed as to light, equipment, and use) should be given first consideration over decorations, monumental facades, etc. The less complicated the plans are, the greater saving in cost of construction and consequently the more space, equipment, etc., that may be obtained. Thus, we are unable to separate the two broad factors of planning—the educational and the financial. These factors must be merged to meet the economic stability and the educational needs of the community.

Citizens of the school community should be invited to come in and review the proposed educational changes and the expansion program. Their suggestions should be solicited and taken into consideration. A sound policy to follow in reference to the school community is a continuous public relations program that will keep the public informed at all times as to the school's needs, accomplishments, etc. When laymen are kept informed as to the needs of the school, their suggestions are more worthwhile, since they are based on actual knowledge.

In case the amount of money available for the building program does not prove sufficient to realize all that is desired, it will be necessary to eliminate certain things. In making the eliminations, pupils should be the first consideration, and factors that seem to apply less to their needs should be eliminated first. For instance, if early provision had been made for a trade and industry department and an agriculture department in the same school and one has to be eliminated, the nature of the community should be considered in making the elimination. In rural situations the agriculture department would be kept and the trade and industry dropped; and vice versa in industrial areas.

As indicated before, it is wise to employ an architect, even before the bond issue is voted, on a "complete-the-job" basis and have him available from the beginning for expert advice in all planning. Most architects will be willing to enter into an agreement with the School Board before the bond issue is voted, with an understanding that if the issue is voted the job is theirs, and if it is not, they will not expect pay for the preliminary work and advice they have given. Especially can the architect be helpful in explaining and selling the program to a citizens committee by preparing for their inspection simple drawings of proposed buildings. A good architect can also be of great help in making suggestions for economy in materials if he knows that economy is necessary.

After completion of the analysis and revision of plans and an agreement on the scope of work, it is necessary to submit plans and specifications to the State Department of Education for suggestions and for their approval of proposals. This stage is the latest point at which this source of help can be obtained; and it would be wise to call for suggestions from the Department earlier in the planning.

The Department's specialists can render invaluable assistance in planning for special services.

In case the expansion program involves several additions to old plants or if there is some doubt as to whether the available money will be sufficient to meet all needs, a good policy to follow in letting contracts is to take bids first on the features that are considered most important.

IV. Organization of and Conducting the Campaign for Public Support of the Program

When qualified voting taxpayers of a school district are asked to support a bond issue for a school building program in their district, they must clearly understand the following:

1. The definite need for the proposed program
2. What the proposed program includes and how it will help meet these needs
3. The cost of the proposed program and the ability of the district to finance it

In all cases it is necessary to organize and conduct a campaign which will create public opinion that is favorable to the proposed program. Every campaign will need a steering committee. The size of the committee and the intensiveness of the campaign will depend on the size and population of the district. The committee should consist of school officials, teachers, supervisors, administrators, and lay leaders; and they should be selected after individual conferences indicate that they are acquainted with all the facts and will give their full cooperation.

At the first meeting of the steering committee, all the problems should be brought out for open discussion. The best approach is to ask for opinions and suggestions, so the campaign plans will come from the entire group rather than from school leadership. Every effort must be made to establish campaign objectives cooperatively. When these key leaders of the community believe that the campaign is a result of their leadership, they will be willing to carry it to the people and assume full responsibility for its success.

To achieve the best results, there should be a planned division of responsibility, including sub-committees. These sub-committees should be composed of key leaders, with a member of the steering committee serving as chairman of each. Various phases of the campaign should be assigned to individuals or to sub-committees. Whenever possible, selected groups or existing organizations should be used to carry the campaign to the public. Full credit should be given to lay leadership for successes during the campaign.

Only the latest facts, authentic, simply stated, honestly presented, and agreed upon by professional leaders, should be used as campaign material. Statistics should be prepared on the following:

1. Inadequacies of existing school plants—such as too few rooms; poor light, heat, ventilation, and sanitation; a need for new buildings, repairs, and alterations
2. District, parish, and state enrollment increases resulting from population trends, from increased birth-rate, and from the holding-power of the school
3. Per capita investment in school buildings as compared to local, parish, state, and national per capita investments
4. Cost of proposed school building program
5. Ability of the local community or school district to provide the proposed program
6. What the proposed building program will include

It is highly important that media of publicity be analyzed with a view to the ways in which each may be most effectively used to acquaint the public with the campaign and create public interest and cooperation. These responsibilities should be assigned to committees whose members are well qualified in the preparation of materials and who have established good working relationships with editors, radio personnel, and publishers. The most useful media are the newspapers, radio, and television.

The campaign should be started well in advance of election day and should be pursued very intensively from then on through election day. All committees actively engaged in the campaign should begin working on the same day. As the campaign progresses, several meetings of committee chairmen will be necessary to assure that all assigned work is being carried out in accordance with the general plans.

The committee should take every opportunity to have selected speakers appear before group assemblies, such as civic clubs, business clubs, women's clubs, fraternal organizations, PTA organizations, and any other group assemblies. There should be called meetings of the general public, to which capable speakers are asked to come prepared to discuss the issue. Individual contacts by selected individuals must be a part of the campaign. On election day a telephone committee should be busy reminding voters who are favorable to the issue to come to the polls.

The following organizations and others may be very helpful in conducting the campaign and guiding the campaign committees:

School Board members
Parent and teacher organizations
Civic clubs
Business clubs
Veterans and patriotic organizations
Home demonstration clubs
Organizations of professional groups
Church groups
Welfare and health groups
Fraternal organizations
Press and radio organizations
Community improvement clubs

V. Legal Procedure for Issuing School Building and Equipment Bonds

Steps of Parish School Board in Floating a Bond Issue

1. Resolution creating the school district and defining its boundaries

   This resolution must be printed in a newspaper published within the district, or if there be no district paper, in a newspaper published in the parish in which the district is situated.

2. Resolution requesting State Bond and Tax Board to grant the School Board permission to hold the election, sell the bonds and use the proceeds for the purpose for which they were voted, and to levy a tax for the retirement of the indebtedness.
3. Resolution calling the election — roll-call vote required
4. Notice of election and proclamation

   Such notices must be published for 30 days in a newspaper published in the respective political subdivision; or if there be no newspaper published therein, then in a newspaper published in the parish. Four publications in a newspaper once a week shall constitute a publication for 30 days, provided 30 days intervene between the date of the first publication and the date of the election.
5. Canvass of election by School Board, sitting as a Board of Supervisors of Election
6. Promulgation of election:

   Must be signed by members of the School Board.

   Must be published in one issue of a newspaper published in the political subdivision, or if there be none, in a newspaper published in the parish.

   Must be made and signed in triplicate.
7. Resolution employing bond attorneys, subject to approval of the Attorney General of the State
8. Resolution authorizing the advertisement for bids for the sale of the bonds

   Advertisement shall be published at least once a week for three weeks, the first publication to be made at least 21 days preceding the date fixed for the reception of the bids, in a newspaper published in the subdivision, or if there be none, in a newspaper published in the parish. Notice of sale shall also be published once a week for three weeks preceding the date fixed for the reception of bids, either in a financial paper published in New York or Chicago or in a newspaper of general circulation published in a city of the State of Louisiana having a population of not less than 20,000 according to the last Federal census.

9. Motion to receive, open, and tabulate bids for purchase of bonds
10. Resolution accepting best bid for sale of bonds—roll-call vote required
11. Resolution providing for issuance of bonds and levying tax—roll-call vote required.

Steps of Parish School Board in Preparing for Bond Election

1. Notify the Registrar of Voters to prepare a list of taxpayers entitled to vote, together with the valuation of each taxpayer's property, as shown by the assessment rolls list made and filed prior to such election.
2. Print ballots.
3. Notify commissioners and clerks of election of their appointments.
4. Arrange for polling places.
5. At least two weeks before date of election, provide Clerk of Court with ballots, list of qualified voters (with their assessments), affidavit, and application for ballot forms.
6. Secure ballot boxes and place in each box the materials listed below:
    List of registered voters, with their assessments
    Numbered list of voters
    Tally sheets
    Pencils and pads
    Ballots
    Instructions to commissioners
    Affidavit forms
    Ink, pens, blotters, and wax
    Envelopes

7. Deliver ballot boxes to clerks a day prior to the election.
8. Arrange for the return of the ballot boxes.

Parish School Board Provides Bond Attorneys With Affidavits from the Following:

A. Publisher of local newspaper used by School Board
   1. That he is the publisher of the paper.
   2. That the resolution creating the school district was published.
   3. That the proclamation or notice of election was published, as provided by law.
   4. That the promulgation of the election was published, as provided by law.
   5. That the advertisement for sale of bonds was published, giving dates of publication.

B. Publisher of financial paper
   1. That he is the publisher of the paper.
   2. That the advertisement for sale bonds was published, giving dates of publication.

C. Assessor
   1. That no other school district is embraced in whole or in part in this special school district.
   2. That none of the territory now embraced in this special school district was embraced in whole or in part by any other school district.
   3. Statement indicating the total amount of the assessment of the special school district.

D. Clerk of Court
   1. That the resolution creating the special school district has been recorded.
   2. That the proces-verbal has been recorded.
   3. That absentee ballots were or were not cast.

E. Secretary of State—that the proces-verbal has been recorded by him.

F. Secretary of the School Board
   1. That no other school district is included in whole or in part in the territory now occupied

by this special school district.

2. That proces-verbal is filed in the archives of the School Board.
3. Relative to ownership of land and buildings in the school district.
4. Relative to correctness of transcript (this must be signed by president of Board and by secretary).
5. Relative to membership of Board and its officers.
6. Relative to newspaper published in district.

G. Registrar of Voters—that a list of qualified voters with assessment of each was furnished the Board for use in the election.

H. Treasurer of School District—relative to the bonded indebtedness of the district

I. Parish Engineer—providing certified copy of official map of the special school district.

Parish School Board Provides Bond Attorneys With the Following Documents:

A. Certified copy of the approval by the State Bond and Tax Board for the School Board to call the bond election

B. Certified copy of the resolution creating the special school district and newspaper clipping of the publication

C. Certified copy of resolution calling the election

D. Certified copy of proclamation and newspaper clipping of publication

E. Copy of official ballot

F. Certified copy of promulgation of the election and a newspaper clipping of the publication

G. Certified copy of the resolution authorizing issuance of bonds, with certified extracts from minutes of Board meeting showing members of Board present and absent, and the vote by members for and against the adoption of the resolution.

H. Certified copy of proceedings of the Board upon sale of bonds, including proof of publication of Notice of Sale in all newspapers in which same was published; a list of bidders who submitted bids for the bonds, together with the amounts of their respective bids; a certified copy of the bid of the successful bidder; and proceedings of the Board in awarding sale of bonds

I. Certificate from the Clerk of Court stating that within the 60-day period no litigation has been instituted in said court questioning the creation of the district or the legality of any of the proceedings authorizing the bonds and taxes necessary to pay for same or for any cause whatsoever

J. Certificate from Secretary of State evidencing registration of the bonds in his office

K. Specimen of executed bond

L. Signature certificate and treasurer's receipt

Parish School Board Files with Clerk of Court the following Documents:

A. Certified copy of the resolution creating the special school district

B. Proces-verbal of the canvass of election in the special school district

Parish School Board Files with the Secretary of State the Following Documents:

A. A copy of promulgation of the election

B. A copy of the newspaper containing the promulgation

NOTE: Copies of necessary forms for legal documents follow.

...., Louisiana
(Name of City)
...., 19........

It was moved by..................................and seconded by .... that the following resolution creating School District No............. in Ward............ of .... Parish, Louisiana, and defining its boundaries and territorial limits, be adopted:

RESOLUTION

Be it resolved that the.. Parish School Board by virtue of the authority legally vested in it under the Constitution and Laws of the State of Louisiana does hereby ordain and create School District No.......... composed of a portion of Ward............. of...................... Parish, State of Louisiana, and does declare the area, boundaries and territorial limits of said district so created to be as follows, to-wit:

(Give Description)

Be it further resolved that this resolution be spread upon the minutes of the Board, duly published, and be recorded in the Conveyance and Mortgage Records of............ .... Parish, Louisiana.

Be it further resolved that this resolution shall take effect immediately upon its adoption.

Upon roll call the following members voted to adopt the above resolution:

Absent:

The resolution was declared adopted.

...., Louisiana
(City)

...., 19......

.... Parish School Board met in regular monthly session in.................................. (Place of Meeting) in ...., (City) Louisiana, at................. (Hour) .... (Day of Week) .... (Month) ...., (Date) 19........, with the following members present:

Absent:

(List the names of members present)

It was moved by.., seconded by ...., and carried that the following resolution be adopted:

Be it resolved by the....................................Parish School Board that the Louisiana State Bond and Tax Board is hereby requested to grant permission to this School Board to hold an election in School District No........., ... Parish, Louisiana, for the purpose of submitting to the property taxpayers of said district a proposition to incur debt and issue bonds to the amount of $............, to run for a period of........................... years, to bear interest at a rate not exceeding 6% per annum, for the purpose of providing funds to.. in .... School District No........., ...Parish, Louisiana.

Be it further resolved that the Louisiana State Bond and Tax Board is further requested to grant permission to this Board to sell the bonds of said School District No......... if said bonds are authorized by a majority vote in said election, to use the proceeds thereof for the purposes for which they were voted, and to levy annually a tax upon all property in School District No......... subject to State taxation to pay the principal and the interest on said bonds becoming due each year.

On motion of.., seconded by ...., and carried the Board adjourned.

.............................., Secretary ...., President

I hereby certify that the foregoing is a true and correct copy of extract of minutes of meeting of ....Parish School Board held on..................................., 19........, as recorded in Minute Book of the proceedings of said Board.

...., Louisiana
(Name of City)

...., 19........

(Signed)..

Secretary, ...
Parish School Board

...., Louisiana
(City)

...., 19........

.............................Parish School Board met in regular monthly session in..............................., ...,
(Place of Meeting) (Address)

...., Louisiana, at................... ....
(City) (Hour) (Day of Week)

...................................., 19........, with the following members
(Month) (Date)

present:

Absent:

The following resolution was offered by........................., who moved its adoption, which motion was seconded by ....:

RESOLUTION

calling special election in special School District No............. of..................................Parish, State of Louisiana, for the purpose of submitting to the qualified property taxpayers of said special School District No................. a proposition to incur debt and issue negotiable bonds of School District No................., Parish of.., State of Louisiana, in the amount of... (................) Dollars, to run for ....(........) years from date thereof, with interest at the maximum rate of six (6) per cent per annum, interest payable semi-annually, for the purpose of .... in School District No. .... of ....Parish, Louisiana, title to which shall be in the public; for providing for the expense of holding such election; providing for notice of said election; providing for the ballot boxes and all the necessary things in the holding of said election; naming the officers of said election, fixing the date for said election, and fixing the time and place at which the result of said election will be canvassed and declared.

Section 1. Be it resolved by the .... Parish School Board that a special election be held in School District No.........................of ....Parish, Louisiana, and the same is hereby called for the .... day of .... in the year 19........, for the purpose of submitting to the qualified property taxpayers of School District No................., ...Parish, Louisiana, the following proposition, to-wit:

Shall School District No................................. of the Parish of ...., State of Louisiana, incur debt and issue negotiable bonds in the amount of .... (.................) Dollars, to run for .... (.................) years from date thereof, with interest at the maximum rate of six (6) per cent per annum, interest payable semi-annually, for the purpose of.. ...., in School District No................. of .... Parish, Louisiana, title to which shall be in the public.

Section 2. Be it further resolved, etc., that on the............ ....day of............................... in the year 19................ at the hour of......................... the... Parish School Board will meet in its office in the city of.................... ....State of Louisiana, and will in open session then and there proceed to open the ballot boxes, ex-

amine and count the ballots in number and amount, examine and canvass the returns and declare the result of said election.

Section 3. Be it further resolved, etc., that the President of the.................................... Parish School Board be and he is hereby ordered and instructed to issue his proclamation calling said election and giving notice that same is to be held on the date hereinbefore mentioned and at the polling places hereinafter named, for the purpose of submitting to the vote of the qualified property taxpayers of School District No. ....of the Parish of.............................. ...., State of Louisiana, the one proposition herein ordered to be submitted to them, and that his proclamation and notice shall state that at the hour of..................... on the......................... day of.. in the year 19........ the .... Parish School Board will meet in the office of the Board in the city of..................... ...., State of Louisiana, and will in open public session then and there proceed to open the ballot boxes, examine and canvass the returns, and declare the result of said election.

Section 4. Be it further resolved, etc., that the polling places for said election shall be as follows:.............................. ....

all in School District No.................., ... Parish, Louisiana.

Section 5. Be it further resolved, etc., that in order to hold the said election the following officers are hereby appointed, each of whom is qualified to vote at said election, being a property taxpayer and qualified voter, to-wit:

....................................., ..., and .... are appointed commissioners of said election and.. clerk thereof, for the polling place fixed at Precinct 1 in

....
(Name of Building)

(Same for each precinct in district)

Section 6. Be it further resolved, etc., that the compensation of the commissioners and clerks at said election shall be.................................... (.........................) Dollars per day for one day each.

Section 7. Be it further resolved, etc., that the secretary of the.. Parish School Board be and he is hereby authorized and instructed to procure for use in the said special election the necessary registration lists, together with a list of the property taxpayers qualified to vote in said election, and to provide the necessary booths, pencils, pads, and the like, and all necessary things and material, and the Secretary of this Board shall have printed the ballots for the said special election in such form as to comply with the form outlined in the succeeding section; and in order to pay for the expense of holding said election, including the pay of commissioners and clerks, the sum of.. (....................) Dollars or as much thereof as may be necessary, be and the same is hereby appropriated out of the Election Fund of this Board.

Section 8. Be it further resolved, etc., that the ballots to be used in said special election shall be printed as follows:

OFFICIAL BALLOT

Special election held in School District No........................ of .... Parish, State of Louisiana, on ...., 19.......

For the incurring of debt and issuance of negotiable bonds, the proceeds of the sale of which are to be used to................ .... in School District No. .... of the Parish of ...., State of Louisiana, title to which shall be in the public.

Shall School District No............................ of the Parish of ...., State of Louisiana, incur debt and issue negotiable bonds in the amount of........................ .... (....................) years from date thereof, with interest at the maximum rate of six (6) per cent per annum, interest payable semi-annually, for the purpose of.. .... in School District No................ of .... Parish, State of Louisiana, title to which shall be in the public.

Yes	☐
No	☐

Taxable Valuation $..

Signature of Voter..

Notice to voter: To vote in favor of the proposition submitted on this ballot, place a cross mark (x) in the square after the word "Yes", and to vote against it place a similar mark in the square after the word "No".

Section 9. Be it further resolved, etc., that the polls for the said election shall open at the hour of six a.m. and remain open until the hour of eight p.m., at which last named hour they shall close.

Section 10. Be it further resolved, etc., that this resolution shall take effect immediately upon its passage.

Upon roll call the following members voted to adopt the above resolution:

The resolution was declared adopted.

Absent:

Adopted and approved this.............................. day of .... A.D. 19........

..............................., President
.... Parish School
Board

Attest:

......................................, Secretary

On motion of..., seconded by ...., and carried the Board adjourned until ...., ..., 19..........
(Hour) (Day of Week) (Month and Date)

..........................., Secretary ...., President

I hereby certify that the foregoing is a true and correct copy of extract of minutes of meeting of.................. .... Parish School Board held on..............................., 19......., as recorded in Minute Book of the proceedings of said Board.

(Signed) ....
Secretary, ...
Parish School Board

...................................., Louisiana
(City)
...., 19

PROCLAMATION

Be It Known That by virtue of the authority conferred upon me by law, and especially by a resolution of the.......... .... Parish School Board passed on.., 19......., I,..............................., President of said Board, do issue this my proclamation giving notice of the calling of a special election within the limits of School District No............ of the Parish of............ ...., State of Louisiana, on

......................, ..., 19 ....
(Day of Week) (Month and Day)

between legal hours, to-wit: 6 a.m. and 8 p.m., for the purpose of submitting to the property taxpayers of said district qualified to vote in said election the following proposition, to-wit:

Shall School District No............................... of the Parish of ...., State of Louisiana, incur debt and

issue negotiable bonds in the amount of.. .... (..............................) Dollars, to run for.................. .... (..............................) years from date thereof, with interest at the maximum rate of six (6) per cent per annum, interest payable semi-annually, for the purpose of .... in School District No. ....of .... Parish, Louisiana, title to which shall be in the public.

Further notice is hereby given that the polling places for the said election have been fixed as follows: Precinct 1 in..; (list each precinct)

(Place)

Further notice is hereby given that in order to hold said election the following officers have been appointed, each of whom is qualified to vote in said election, being a property taxpayer and qualified voter, to-wit:

.., ..., and .... have been appointed commissioners of said election and... clerk thereof, for the polling place fixed at Precinct 1 in ....

(Place)

(List commissioners and clerks for each precinct)

Further notice is hereby given that at the hour of.......... .... on the.................................. day of.................................., 19.........., the .... Parish School Board will meet in the Board's office in the city of.......................... ...., Louisiana, and will then and there open the ballot boxes, examine and count the ballots in number and amount, examine and canvass the returns and declare the result of said election.

Issued by me officially at...,

(City)

Louisiana, on this.............................. day of..................................A.D. 19..........

.., President
.. Parish School
Board

Attest:

...................................., Secretary
.... Parish
School Board

I hereby certify that the foregoing is a true and correct copy of proclamation of President of the........................ .... Parish School Board calling an election in School District No.............................., ... Parish, Louisiana.

....
Secretary, ...
Parish School Board

..................................., Louisiana
(City)
..................................., 19.........

(SAMPLE)
PROMULGATION OF ELECTION

STATE OF LOUISIANA:
PARISH OF ....:

BE IT KNOWN That the..................................Parish School Board, acting under and by virtue of the authority conferred upon it by law, did meet at the hour of.............. on............................., 19........, in the office of the Board in the..., in the City of.., Parish of ...., Louisiana, and in open session did proceed to open the ballot boxes, examine and count the ballots, examine and canvass the returns and declare the result of the special election held on................................... 19........, called by the...Parish School Board by a resolution passed and adopted on the.................. day of..................................., 19........, for the purpose of submitting a proposition to the property taxpayers of School District No..................., ... Parish, Louisiana, for the incurring of debt and issuing of bonds to the amount of $..............................., and we the said Board, in the presence of............................... and..................................., qualified witnesses, and such others as desired to be present, do make the following compiled statement of the result of said election, to vote for and against said proposition being as follows, to-wit:

> Shall School District No............................ of the Parish of ...., State of Louisiana, incur debt and issue negotiable bonds in the amount of............................ .... (........................) Dollars, to run for .... (........................) years from date thereof, with interest at the maximum rate of six (6) per cent per annum, interest payable semi-annually, for the purpose of.. ....
> in School District No.................... of.................................... Parish, Louisiana, title to which shall be in the public.

Number of votes for said proposition........ ....
Number of votes against said proposition.. ....
Majority in number in favor of said proposition ....
Property valuation in favor of said proposition .... $..........................

Property valuation against said proposition .... $__________

Majority property valuation in favor of said proposition .... $__________

And it appearing that the said proposition was carried by a majority in both number of votes and amount of the assessed valuation voted at said election as shown by examining and counting the ballots in number and amount, and by examining and canvassing the sworn returns of said election we do accordingly ratify said sworn returns of said election and approve the same, and declare that the said proposition has been carried both in numbers of votes, and in assessed valuation of property as hereinabove set forth, and we do hereby accordingly make public proclamation of the result.

Thus done and signed in triplicate in open session by the ....Parish School Board in the presence of the hereinabove named and the undersigned witnesses and all others who desired to be present on this ....day of ....in the year 19..........

____
President

____
Member

(List each member)

____
Secretary

Witnesses:

____

____

Sworn to and subscribed before me, Notary, at.............. ...., Louisiana, on this the.................... day of..............................in the year 19..........

(SEAL)

____
Notary Public

Whereas, at an election held in School District No. .... of ....Parish, Louisiana, on ...., 19......, the qualified electors voted to authorize the issuance of bonds of School District No................ in the amount of $......................., for the purpose of providing funds to.. .... in .... School District No.............. of the Parish of.................. ...., State of Louisiana, title to which shall be in the public, and

Whereas, it is necessary to secure the approval of regular bonding attorneys, such as..................................
(Name of Firm)
of..............................as to the legality of the procedure in
(City)

the issuance of the bonds of School District No.................. in order to market said bonds, therefore

Be it resolved by the....................................Parish School Board that.. of
(Name of Firm)
..................................be and they are hereby employed
(City)
to pass on the legality of the procedure in the issuance of the bonds of School District No............... of.................. ...., Parish, Louisiana, and that the payment therefor be fixed at.................................. (......................) Dollars, subject to the approval of the Attorney General of Louisiana.

Adopted and approved this..........................day of .... A.D. 19........

(Signed) ....
President

Attest:
(Signed)..
Secretary

I, ..., Secretary of the ....Parish School Board, do hereby certify the above and foregoing to be true and correct copy of the original resolution adopted by said School Board in regular session, at which meeting a quorum was present.

In Witness Wherefore I have hereunto signed my name and affixed the seal of said School Board, on this the...................... day of...................... A.D. 19........

(SEAL)
....
Secretary, ...
Parish School Board

The attached resolution of the.................................. Parish School Board setting forth the necessity of securing the approving opinion of regular bonding attorneys for the approval of school bonds and the employment of................. .... to approve the bonds of School District
(Name of Firm)
No............... and the payment therefor, having been duly considered by me, ..., Attorney General of the State of Louisiana, I hereby give my written approval to the said..........................Parish School Board to the employment of.. for the
(Name of Firm)
purposes and upon the terms set out in said resolution.

Thus approved by me on this...................... day of ..................................A.D. 19......, at Baton Rouge, Louisiana.

(Signed) ....
Attorney General of Louisiana

...., Louisiana
...., 19.......

It was moved by ...., seconded by ...., and carried that the Secretary of this Board is hereby authorized and instructed to advertise for bids for the sale of the bonds of School District No. ...., ... Parish, Louisiana, to be received until ....,
(Hour) (Day of Week) (Month and Day)
19........, the advertisement to be placed in the .... of ...., and in the ....
(Financial Paper) (City)
.... of ....
(Newspaper Published in Political Subdivision) (City)
Louisiana, in accordance with the provisions of law for such advertisements.

Be it further resolved that this advertisement shall state that each bid shall be accompanied by a certified or cashier's check payable to the.............................Parish School Board for 3% of the amount of the bonds; that checks of unsuccessful bidders will be returned immediately, and that check of the successful bidder will be retained until the said bonds are delivered and payment received therefor.

Be it further resolved that this advertisement shall state further, that in case the successful bidder does not comply with the terms of his bid, the certified or cashier's check shall be forfeited to the.. Parish School Board as liquidated damages.

On motion of....................................., seconded by ...., and carried the Board adjourned until the next regular meeting date on ...., ..., 19.........

____
President

Attest:

....
Secretary

____________________________, Louisiana
(City)

____________________________, 19........

____________________Parish School Board met in regular session in the ____________________, ____________________
(Place of Meeting) (Address)
____________________, Louisiana, at __________, ______________
(City) (Hour) (Day of Week)
________________ ______________, 19________, with the following
(Month) (Date)
members present: ____________________________, President,

(List names of members)
and..., Secretary.

Absent:

It was moved by ...., seconded by ...., and carried that the Board receive and open bids for the sale of $............................... bonds of School District No...................., ...Parish, Louisiana, advertised to be received at this time. The following bids were received:

(Bid)
(Bid)
(List each bid)

It was moved by .... and seconded by .... that the following resolution be adopted:

Be it resolved by the ....Parish School Board that the bid of .... (Name of Bidder) offering.................................... (Bid) be and the same is hereby accepted.

Be it further resolved that the President and the Secretary of this Board be and they are hereby authorized and instructed to have these bonds duly executed, signed, registered, and delivered to the said .... (Name of Purchaser) in.................................... (City), ... (State), on payment by said purchasers of the amount of bid for these bonds, and to furnish to said purchasers the written opinion of .... (Name of Bonding Attorneys) approving the proceedings had in connection with the issuance of these bonds together with a complete transcript of such proceedings.

Upon roll call the following members voted to adopt the above resolution:

Absent:

The resolution was declared adopted.

It was moved by............................... and seconded by .... that the following resolution be adopted:

RESOLUTION

Providing for the issuance of School.................................... (Name of bonds—such as Building and Equipment Bonds, Buildings Bonds, etc.) .... of School District No..............., ... Parish, State of Louisiana, to the amount of ....

(....................) Dollars, and levying a tax of .... (....................) mills on the dollar of the assessed valuation upon all property within the limits of the said district subject to state taxation in the year.................... to pay the interest due on said bond issue on.................................... (Date), 19........, and that part of the principal and the interest due on the said bond issue on.................................... (Date), 19............

Whereas, at a special election duly and regularly called and held in School District No.................... in the Parish of ...., State of Louisiana, on ...., 19........, a proposition to incur debt and issue bonds of said district to the amount of .... (....................................) Dollars, to run for.................................... (....................) years, with interest at the maximum rate of six (6) per cent per annum, interest payable semi-annually, for the purpose of.. in School District No.................... of the Parish of.................... ...., State of Louisiana, title to which shall be in the public, was duly and regularly submitted to the vote of the property taxpayers of said school district, qualified to vote as electors under the Constitution and Laws of the State of Louisiana, and

Whereas, the incurring of said debt was duly authorized by the vote of the majority in number and amount of the property taxpayers of said school district qualified and voting at said election, and

Whereas, Section 35 of Act No. 46 of the year 1921 of the Legislature of the State of Louisiana makes it the duty of the.................................... Parish School Board to levy annually a special tax in addition to all other taxes, sufficient to pay the interest and the principal becoming due on the said bond issue for each year, therefore

BE IT RESOLVED by the.................................... Parish School Board that the President of this Board and the Secretary of this Board be and they are hereby authorized and instructed to prepare and execute.................................... (Number of Bonds) negotiable bonds to be known as ".................................... (Name of Bonds) of School District No.................... of.................................... Parish, State of Louisiana", and of the denomination of .... (....................) Dollars each, all dated ...., 19........, each bond bearing interest at the rate specified below, interest payable semi-annually on the.................... day of.................... (Month) and the.................... day of.................... of each year, until

the final payment of the principal and interest on said bond issue, the principal and interest of the said bond issue to be paid at the ....,
(Name of Bank)
...., Louisiana. The bonds shall
(Name of City)
be numbered from one to.............. inclusive, and shall become due and payable and shall bear an annual interest rate as follows, to-wit:

No. of Bonds	Amount	Annual Interest Rate	Date Payable
1, 2, etc.			

Interest on the said bonds shall be evidenced by the proper coupons attached to each bond, and both principal and interest shall be payable in lawful money of the United States of America. Said coupons shall be executed by the facsimile signature of the President and of the Secretary of the..Parish School Board.

Section 2. BE IT FURTHER RESOLVED, etc., that each of the bonds and interest coupons to be attached thereto shall be substantially in the following form, respectively, to-wit:

UNITED STATES OF AMERICA
STATE OF LOUISIANA

Parish of..................................
No....................

School District No...................
$...................
(Denomination)

....................of School District No...................
(Name of Bonds)

KNOW ALL MEN BY THESE PRESENTS That School District No.................... in.................................... Parish, State of Louisiana, acknowledges itself to be indebted and for value received hereby promises to pay the bearer thereof the sum of.. Dollars on the.................. day of..............................., A.D. 19......, together with interest on the said sum from date hereof, until paid, at the rate of............... per cent per annum, interest payable semi-annually on the............... day of............................and the.................day of...................... in each year, in accordance with and on presentation and surrender of the interest coupons hereto attached as they severally become due.

Both interest and principal of this bond are payable at the..., ...
(Name of Bank) (City)
Louisiana, in lawful money of the United States of America,

and for the prompt payment of this bond with interest as aforesaid at maturity, the full faith and credit of School District No.__________, ____________________Parish, State of Louisiana, are irrevocably pledged.

This bond, one of a series of____________________
(Number)
bonds of like date, tenor and amount, except as to rate of interest and maturity, is issued by the said School District No.________, ____________________Parish, State of Louisiana, for the purpose of______________________________ in ______________________________ School District No.__________ of the Parish of______________, State of Louisiana, title to which shall be in the public, under and pursuant to and in full conformity with the Constitution and Statutes of the State of Louisiana, and is authorized by a majority in number and amount of the property taxpayers qualified as electors under the Constitution and Laws of the State of Louisiana, voting at an election duly and regularly called and held in School District No.________, ____________________Parish, State of Louisiana, in the manner prescribed by the Constitution and Laws of the State of Louisiana.

It is certified that this bond is authorized by and issued in conformity with the requirements of the Constitution and Statutes of this State. It is further certified that provision has been made for the collection of an annual tax on the taxable property in this district, sufficient to pay the interest on and the principal of said bonds as the same respectively become due.

IN TESTIMONY WHEREOF, the____________________ Parish School Board, the governing authority in School District No.__________ has caused this bond to be signed by its President and attested by its Secretary, and the coupons hereto annexed to be executed by the facsimile signature of its President and of its Secretary on this the ______________ day of______________, in the year of Our Lord, Nineteen Hundred____________________

____
President

____
Secretary

FORM OF COUPON

Coupon No.__________ $__________

On the__________ day of______________, 19______ School District No.______________________________ Parish, State of Louisiana, will pay to the bearer hereof the sum of____________________Dollars in lawful money of the United States of America, at the______________ (Name

...., ..., Louisiana, be-
of Bank) (City)
ing six months' interest on that day due on..............................
.... of School District No...............
(Name of Bond)
dated.., 19.........
Bond No. ....

....
President

....
Secretary

Section 3. BE IT FURTHER RESOLVED, etc., that the proceeds of the sale of the said bonds shall be devoted solely and entirely for the purpose of..............................in School District No................. of the Parish of..............................
....
.................................., State of Louisiana, title to which shall be in the public and none other.

Section 4. BE IT FURTHER RESOLVED, etc., pursuant to law and especially to Section 35 of Act No. 46 of the year 1921 of the Legislature of the State of Louisiana, a tax of.. (..............................) mills on the dollar of the assessed valuation of all property subject to State taxation within the limits of School District No................., ... Parish, State of Louisiana, is hereby levied for the year 19......... for the purpose of paying the interest of the said bond issue due.., 19........, and that part of the principal and interest of the said bond issue due..............
...., 19.........

Upon roll call the following members voted to adopt the above resolution:

Absent:

Adopted and approved this.................................... day of
.... A.D. 19.........
..............................., President
..................................., Secretary

On motion of.............................., seconded by ...., and carried the Board adjourned until......................................,
(Hour)
...., 19.........
..............................., President
...., Secretary

I hereby certify that the foregoing is a true and correct copy of extract of minutes of meeting..............................

.... Parish School Board held on......................,
19.........

(Signed) ....
Secretary, ...
Parish School Board

...., Louisiana
...., 19.........

CHAPTER TWO

Sites

Any guide for selecting a school site must be flexible enough to allow for such variable factors as (1) size and type of school and (2) nature of educational activities to be accommodated.

In developing a school site, landscaping and its component problems, such as drainage, roads, walks, grade, lawn, etc., must be considered. It is important that plans for site development be made at the time the building plans are drawn up. By so doing, sufficient money may be allocated to the development of the site rather than leaving this phase of the program as an afterthought.

Location

"Schools should be located near the center of the present and most probable future population to be served. It is desirable to locate schools within walking distance of the greatest number of pupils and with regard to accessibility from feeder streets and roads for those transported by bus. Density of population and traffic conditions will help to determine the spacing of schools. The distance considered as a reasonable maximum for pupils walking to school is one mile. The one-way travel time for pupils transported to school is considered to be a maximum of one hour.

"In school districts where it is anticipated that there will be a growth or spread of population, sites should be located to avoid undue overlapping of the areas to be served by each school. In attempting to determine the geographic boundaries of such areas, the following controlling factors must be considered: (a) enrollment range for each school type, (b) possible future residential development that may affect the probable number of children per unit of area, (c) transportation of children, (d) the hazards and natural barriers which affect the accessibility of a given school, and (e) the policy of maximum sizes of schools.

"The environment of the school site is very important. It should provide: (a) healthful conditions for the pupils and teachers while at school, (b) safe conditions for all while on the school grounds, in the building, and in the immediate neighborhood of the school, (c) freedom from all disturbing noises, such as those resulting from heavy trucks, automobiles, railways, and airplane traffic, fire sirens and factory whistles, (d) freedom from obnoxious odors, and (e) pleasing surroundings that will tend to create a feeling of pride, happiness, and contentment."

The site should be located so that the school may use all available public-service facilities, such as water, gas, sewers, fire protection, and electricity.

Size, Shape, and Physical Features of Sites

With the concept of the "community-centered" school has come the need for enlarged acreage for school sites. This need is emphasized by many factors, such as provision of facilities for games and recreation for groups of various ages (including adults), outdoor instruction in physical education and other fields, and the relationship of the school site to over-all community planning.

Many school sites are too small to accommodate the increased activities of the schools' programs. Modern schools require sites larger than were thought necessary a few decades ago. Larger areas are required to provide for a continuous expanding educational program, for many community activities, and ample space for future needs. The trend all over the country toward one-story buildings increases the amount of land area required for school sites.

The size of any school site should be determined largely by the nature and scope of the contemplated educational program. Actual layouts of the spaces needed by the various phases of the program should be made. While it is recognized that for many schools much larger areas are preferred, the acceptance of the following suggestions will be an improvement for many of the schools throughout the country:

1. For *elementary schools*, it is suggested that there be provided a minimum site of 5 acres plus an additional acre for each 100 pupils of predicted ultimate maximum enrollment. Thus, an elemen-

tary school of 200 pupils would have a site of 7 acres.

2. For *junior high schools*, it is suggested that there be provided a minimum site of 20 acres plus an additional acre for each 200 pupils of predicted ultimate maximum enrollment. Thus, a junior high school of 500 pupils would have a site of 25 acres.
3. For *senior high schools*, it is suggested that there be provided a minimum site of 30 acres plus an additional acre for each 100 pupils of predicted ultimate maximum enrollment. Thus, a senior high school of 1,000 pupils would have a site of 40 acres.

Because the site-size problem varies in accordance with the needs of the type of school organization and in terms of the age and development status of the community or school district, the foregoing rules must be taken as *minimums* for which all should strive and which most should exceed. It must be recognized that each type of situation has its own specific variations which must be studied before sites are chosen.

The highly specialized schools will require additional acreage. For example, agricultural and aeronautical schools will require greatly increased acreage in their school sites.

Usually a rectangular shape is preferred for the school site. It is easier to arrange buildings, drives, parking spaces, play and recreational areas, service areas, and fields for sports on a rectangular plot than on an irregularly shaped site. The rectangular shape is recommended, with a front to back ratio of 3 to 5. However, irregularly shaped sites can be made suitable by proper planning.

The ideal condition exists where the general contour of the site is slightly convex, with the building placed at the highest point. However, the ideal condition is seldom found, and grading is usually necessary in order to provide proper drainage.

Soil conditions should be examined before purchase of a site. Adequate test borings should be made to determine the characteristics of the subsoil. Good topsoil is needed in order to provide healthy lawns and shrubs. Contracts for excavations and foundations should specify that the topsoil should be removed and piled so that it can be re-used after the building is completed.

Elevation of the site is important and is too frequently overlooked. The site should be high enough to be protected from floods in low sections and should not be at the bottom of hills where water would drain down onto the school site.

Topography Utilized *for* Radiation Shielding

If fallout shelter space is a part of the plant, the site grading may provide protection via embankments, berms, entrenchments, or if the building is placed on a plateau.

Placement of Buildings on Site

The size, shape, and contour of the site will have much to do with the placement of the buildings. The well-drained areas should, as much as possible, be left for play areas; however, the facing of the buildings will depend largely upon the streets or highways adjoining the site.

Sufficient space should be allowed between the streets and buildings for effective landscaping as well as for safety. Also, if the total area is large enough, the space left between the street and the building could be increased to serve as small play areas for several of the smaller groups of children. This greater space will make it possible to further remove classrooms from street or highway noises.

Proper spacing of buildings will provide adequate and readily accessible unloading and loading surfaces for buses. If there are several entrances to buildings, the drives should not cross any play areas. The buildings should also be so placed as to avoid a driveway around any building or between two buildings.

If the elementary and the high-school pupils are in separate wings of the same building or in separate buildings, the lunchroom, gymnasium, and auditorium should be located approximately between the two areas. Should a playroom be available in addition to the gymnasium, it should be placed near the primary grades. As much as possible attention should be given to locating certain parts of the building or buildings adjacent to play areas or athletic fields. For example, the dressing rooms of the gymnasium should have exits which are easily accessible to the teams going to and from track or football areas.

Should the school plant consist of several buildings or clusters of buildings, covered walkways are necessary and these walkways, particularly to the lunchroom, *should never* be traversed by auto or truck traffic. The pantry door of the lunchroom should be adjacent to a driveway which is not frequented by the children. A building which houses lawn mower, tractor, and other machines used on the campus should be near the side entrance and easily accessible to all areas.

Walks, Drives, and Parking Space

Suitable *walks*, preferably concrete or hard surfaced, should be included in the development of all school sites. Walks should connect all buildings and should lead from the main entrances to streets and bus-loading stations. They should follow natural and direct lines and be located far enough from buildings to allow for the planting of flowers within the spaces between buildings and walks. Walks should be so constructed that children and adults will be inclined to follow them instead of cutting across the lawn or walking on the grass. They should be wide enough to take care of two or more people walking abreast. Where traffic is heavy, they should be of the minimum width of seven or eight feet. Neither walks nor drives should serve a dual purpose; in the interest of safety, they should be constructed separately and should never intersect.

Driveways should be built so that traffic will be forced to keep within specified limits. The single, two-lane drive, leading directly to the main point of discharge and connecting with a parking area, is considered the best layout for general passenger drives. Schools providing bus transportation for pupils should provide a safe and convenient bus-loading area in the school site. It is undesirable to have a drive that encircles the building or cars driving very close to the building at any point. The type of driveway constructed should be economical in both first cost and maintenance and should be properly drained.

Parking areas on the school grounds for visitors, teachers, and other school employees are essential; but such areas should be so located as not to interfere with needed play areas.

Site planning should also provide drives for trucks making deliveries to lunchrooms and supply rooms. It is a good idea to locate lunchrooms and portions of other buildings requiring truck service as near to side streets as possible. This will help eliminate traffic hazards and will allow for larger playground areas. Passenger drives should be kept separate from service drives if possible. Service and delivery areas should be separated from recreational areas by the planting of appropriate shrubbery.

Physical Activity Areas

In planning a new school site, the authorities should earmark sufficient funds for development of the grounds and see that consideration is given to the variety and number of pre-school and school-age children, out-of-school youth and adults to be served. Then they should determine the total acreage needed for all purposes. Such planning should eliminate costly duplications in the community for physical education and recreation.

The selection of a particular area will depend on the type of school center to be served, the geography of the area, the climate, the natural features of the area, the extent to which the school site can be devoted to recreation and existing community facilities.

Priority in means of access to and from the school building should be given in the following order: pre-school, primary and intermediate, upper elementary, secondary school girls, secondary school boys, and interscholastic athletic participants. Questions of time and isolation are considered more important from the standpoint of general school use (for efficiency and safety) than for general community use. Activity areas should be located in such a way as to insure maximum efficiency in supervision and safety. Areas which have close activity relationship or are used by the same age groups should be located close to one another. Facilities for use of spectators should be located close to parking areas.

There should be provided for the young elementary children a separate shady area with such play facilities as tree house, slides, sand boxes, climbing structures, and jungle gyms. It is also desirable to allocate space on which they may play informal games.

Because interests and abilities of boys of the upper-elementary grades are so different from those of the girls of that grade level, it is advisable to provide separate play areas for the two sexes. The girls of this age group should be provided with a few pieces of play apparatus, but their area should be devoted largely to space for informal games. The boys' area will be used for organized games and sports.

Girls in secondary school should be provided considerable area for such games as softball, volleyball, badminton, archery, and field hockey. The secondary school boys should have facilities for such activities as softball, volleyball, badminton, basketball, baseball, football, track, and field events. Play area should also provide for many of the following activities: paddle tennis, shuffleboard, croquet, horseshoes, tennis, touch football, and as many other activities as the climate may permit.

Adequate and appropriate safety zones, fences, and natural barriers should be provided between and around activity areas. Provisions should be made for appropriate surfacing of various areas. All field and court areas for games and athletics should be of official size and have official markings. Sleeves with removable caps (flush with playing surface) should be used to provide for movable posts or multiple-use paved areas. Movable and removable backstops and goal posts should also be considered. Such facilities as toilets, lavatories, electrical and water connections, and storage space should be readily accessible. There should also be provisions for over-all drainage and proper grading to insure quick drying of all areas. Economy should be a consideration, both in installation and maintenance of facilities.

Landscaping and Beautification

A comprehensive planting plan should be prepared for the school grounds before any planting is done. In general, a school-ground planting scheme will consist of seeding or sodding of lawns, foundation planting to tie the buildings to the ground, intersection plantings of hardy shrubs at angles and curves of drives and walks, tall trees to frame the building and trees planted in groves for shade. It is desirable to have a natural wooded area for outdoor education and for school and community recreation.

The classes of plants generally used on school grounds are: shade trees, smaller ornamental trees, coniferous evergreens, broad-leafed evergreen shrubs, deciduous flowering shrubs, vines, and ground covers. Plants should be grouped with respect to height, color, and plant-culture requirements. When all of the planting cannot be done at one time, the shade trees should be planted first.

Rural school grounds may be planted in an informal manner with plants which are indigenous to the locality. Urban schools may have a more formal planting made up of a broader assortment of commercially developed varieties.

Site planting should retain and protect as many of the existing trees as can be absorbed effectively in the total plan. Trees may be planted along the roads and borders of the site and in other places where shade is desired. Tree culture is a highly developed science, and local school officials should avail themselves of competent advice from federal, state, and local authorities in this field before undertaking extensive programs of tree planting.

Shrubs, especially the flowering varieties, are very desirable on school grounds. There are many zones of hardiness and shrubs should be carefully selected according to soil, shade, and climatic conditions. Trees and shrubs should not be located close enough to school buildings to obstruct light from classrooms. Foundation plantings should not be permitted to grow above the window sill.

Shade trees are desirable around the borders of play areas. Shrubbery should be planted in such a way as to make the spaces attractive and at the same time not interfere with children's play. Perennial vines are desirable on fence rows and blank walls and for the purpose of hiding unattractive objects. Grass suitable for the soil and climate should be grown on all areas except those for agricultural use and those devoted to playground activities in which grass is not desirable. A well-kept lawn is fundamental to any planting scheme, but the lawn should receive consideration secondary to the play area.[1]

General Recommendations

1. Plan now for meeting school and community needs and for elimination of costly duplications in the facilities for physical education and recreation.
2. Give consideration to the variety and number of recreational program requirements and the number of pre-school and school-age children, out-of-school youth, and adults to be served.
3. After deciding on the program requirements for the school-age children and the requirements for general community purposes, determine the acreage for these purposes, usually 10 to 40 acres.
4. The school building should be located so as to allow for maximum utilization of the site in keeping with orientation and service requirements.
5. Priority in access to and from the school building should be in the following order: pre-school, primary and intermediate, grade-age children, secondary school-age girls, secondary school-age boys, and interscholastic athletic participants. The matter of time and isolation are considered more important from the standpoint of general school use (for efficiency and safety) than for general community use.
6. Activity areas should be located in relation to each other in such a way as to insure maximum efficiency in supervision and safety.
7. Adequate and appropriate safety zones, fences, and natural barriers should be provided between and around activity areas.
8. Plans should include provisions for over-all drainage and grading to insure quick drying of all areas and for appropriate surfacing of various areas.

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[1] American Association of School Administrators, *American School Buildings*, 27th Yearbook (Washington, D. C. 1949), pp. 73-78.

Economy should be a consideration both in installation and in maintenance.

9. It is desirable for an area of the campus to be hard-surfaced for use as a play area.
10. Use sleeves with removable caps (flush with playing surface) to provide for movable posts on multiple-use paved areas. Movable or removable backstops and goal posts should also be considered.
11. Provisions should be made for readily accessible facilities, such as fountains, toilets, lavatories, electrical and water connections, and storage space.
12. Accommodations for spectators and parking should be in line with general purpose and needs.

Mistakes to Be Avoided

1. Some school sites are poorly located in relation to community growth, traffic and other safety hazards, accessibility, beauty and utility.
2. Many land areas are too small to meet either school or community needs.
3. Many buildings are poorly situated on the school site. A building located in the center of a meager plot spoils the surrounding area for practical use and wastes space and money.
4. Service drives and loading zones are often poorly located. They often create safety hazards and infringe on play space.
5. Parking areas are often inadequate, poorly arranged, or improperly located. Congestion, inconvenience, and safety hazards are the results.
6. Insufficient space is often allowed for play courts and field areas.
7. There is often not enough variety in types of areas to provide for a wide age range and different community interests.
8. Court, game, and field areas are sometimes poorly located in relation to the building.

9. There is often a lack of planning for multiple use of courts and other paved areas.
10. Planning is sometimes based on spectator accommodations rather than on requirements for multiple use.
11. Special interests are sometimes allowed to dominate planning. First consideration may be given to football field and stadium rather than to provision for classroom instruction and general recreation.
12. Often there are insufficient accommodations for spectators.
13. Fences, hedges, and safety zones are not always well laid out; thus they often fail to serve as protection from street traffic, steep inclines, swings and other apparatus, etc.
14. Play surfaces are often inadequate because of insufficient topsoil for a good turf or because of poorly selected surfaces.
15. Often there are too few shade areas, with trees and shelter, for quiet activity.
16. Outdoor lighting facilities, needed for multiple use of areas, are non-existent in many communities.
17. There is often a lack of appreciation on the part of administrative, instructional, and maintenance personnel of the fact that well-planned outdoor education-recreation areas and facilities can be both beautiful and functional.
18. The acquisition of school sites must be in conformity with all Louisiana statutes.

2 OF 3

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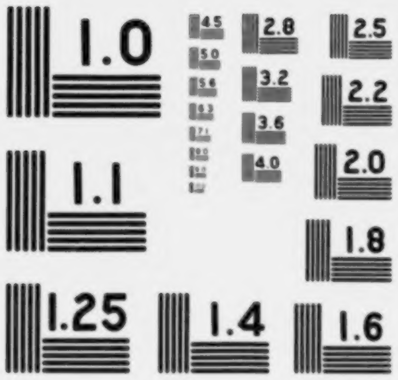
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963

CHAPTER THREE

The Building

Architectural Characteristics and Design

In one sense a school building is as much an instructional device as is a book or a piece of science apparatus; in another sense it is a place where youth and adults work and live together for some six hours each school day from early fall until late spring; in still another sense the school is a major institution in our culture, and as such it becomes an integral part of our evolving way of life.

Under these assumptions such characteristics as the following appear to be evident:

A. The school plant should be *flexible* and *functionally adapted* to a variety of learning experiences.

B. Living and working spaces should be scaled to the size of the students and the demands of an effective program of education at all levels of instruction, incorporating the reality that students learn in a variety of ways and require multiple media for effective growth and development.

C. Health and safety are paramount considerations wherever human beings are concerned. Matters pertaining to health and safety are carefully regulated by the state and local Boards; yet the exercise of these regulatory functions by other agencies does not excuse school personnel from giving careful study to the matter of traffic control, lighting, heating, ventilation, sanitation, exits and entrances, stair wells, construction materials, and space relationships.

For many years educators have followed the practice of orienting a school plant on an east-west axis with north-south fenestration. This provides the optimum light and ventilation characteristics in this particular climate.

D. A school plant, to be an effective force in the community, should lend itself to a wide variety of uses by that community; such as folk dancing, discussion groups, the theater arts, hobby and craft work, service-club meetings, and a host of other activities by both youth and adults.

E. For too many years public buildings have been designed with the exterior appearance of some classic order of architecture, or they have been copies of famous buildings watered down to meet some particular budget. School buildings have not escaped this force. Recommendation is being made that school plants convey in outward appearance the requisites of flexibility and adaptability, that ornamentation be reduced to a minimum, and that, through the use of contemporary building materials in a straightforward manner, beauty of the completed building be achieved through use of clean-cut lines and pleasing balances of horizontal and vertical masses.

Fallout shelter spaces, planned integrally with the school plant, can be provided without sacrificing spaces and functions of the school plant, and in some cases, without any increase in cost. OCD Technical Report TR-19, available from local CD offices, gives many examples of school designs which incorporate shelters.

F. A functional school plant demands many types of services for effective operation. It is recommended that careful consideration be given to walks and drives, parking areas, bus traffic, and truck access to lunchroom, shop, and mechanical areas.

G. Finally, a school plant should be economical in initial cost, upkeep, and repair. Incorporated in this idea is the principle of adaptability, through which future modifications may be achieved. The recommendation is made that non-bearing partitions, open-end corridors, interchangeable storage units, and multi-purpose rooms be employed in the basic design and that the entire structure be so located on the site that, if additions are required, it will not be necessary to violate the recommendations contained herein.

Plan Types

A. Classes of Buildings by Use

Schools are here considered as divided into three general classes: elementary, junior high, and high. In certain instances, a combination type (for twelve grades) must be considered as a fourth class of building.

In general, the following discussion refers to the three main subdivisions mentioned above, of which many requirements are common to all. Among the facilities which are requisite to each class of building are:

- Teachers' lounge
- Office space
- Teachers' work room
- Lunchroom
- First aid and examination room
- Storage space
- Toilet rooms

For all classes of schools, if possible, main corridors should run in an east-west direction, with rooms on the north and/or the south sides.

ELEMENTARY SCHOOL

General requirements. This class of school should properly be composed of a number of classroom units, each one being considered as a separate laboratory. Inasmuch as an elementary school is usually the small child's first introduction to a more or less formalized system of education, the rooms should be arranged so as to promote an attitude of personal interest among the youthful students, and the environment should be such as to make the children feel comfortable, both at work and at play. The structure should be of one story and built to accommodate a maximum of five hundred students, each classroom to hold not more than 30 pupils. The building should be designed to accommodate a maximum of three (3) sections of each grade to be taught.

Play and assembly room. The facilities required for an elementary school are the same as those mentioned previously, with the additions of a play room, this room to serve also as a small assembly hall.

Classrooms, lockers, and sanitary facilities. Recommendation is made that the classroom area be approximately 28′ by 36′. Each classroom area should be about 750 to

800 square feet. Each classroom should be a self-contained unit, with corridor exits and outside exits opening into play areas. Experimentation has indicated that exterior opening classroom doors can present quite a heating problem on some of our extremely cold and windy days. A work room with sink and work table should be installed in connection with each classroom, and each classroom should have its own drinking fountain. In the primary grades (1st, 2nd, and/or 3rd) toilet and lavatory facilities should also be a part of the classroom. Each classroom should have adequate clothing lockers, accessible from the classroom only.

Worktables and storage space. The work table should have storage space underneath and each room should be equipped with book storage with adjustable shelving. A teacher's locker of a design that can accommodate standard

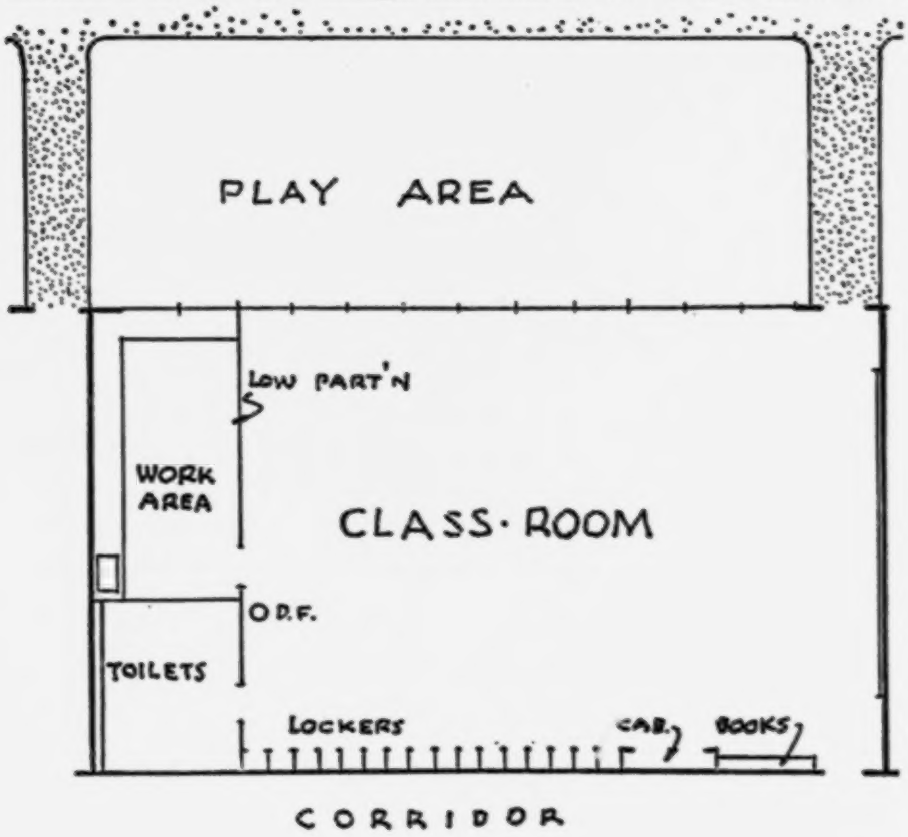

FIGURE 1.
NO SCALE

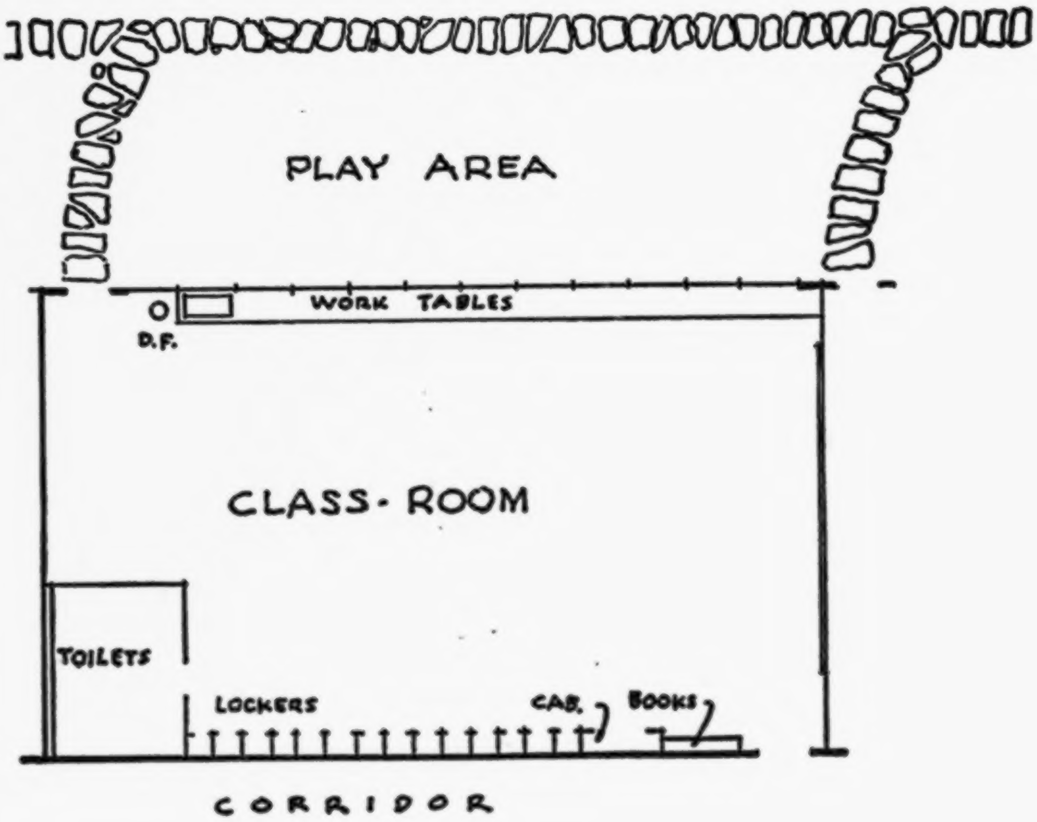

FIGURE 2

NO SCALE

poster paper, roll of maps, globes, teachers' wraps, etc., should be provided. Large adjustable shelf areas are essential.

JUNIOR HIGH SCHOOL

General requirements. In a junior high school the students are more mature and independent and do not stay in the same room throughout the day. The same common facilities are required on this level, with the addition of a gymnasium and a library.

It is recommended that this class of school be limited to eight hundred students and that the structure be a one-story building for a capacity up to five hundred students and a two-story building for a greater capacity. In any conditions, the gymnasium and the shop (if required) should be a one-story portion of the building.

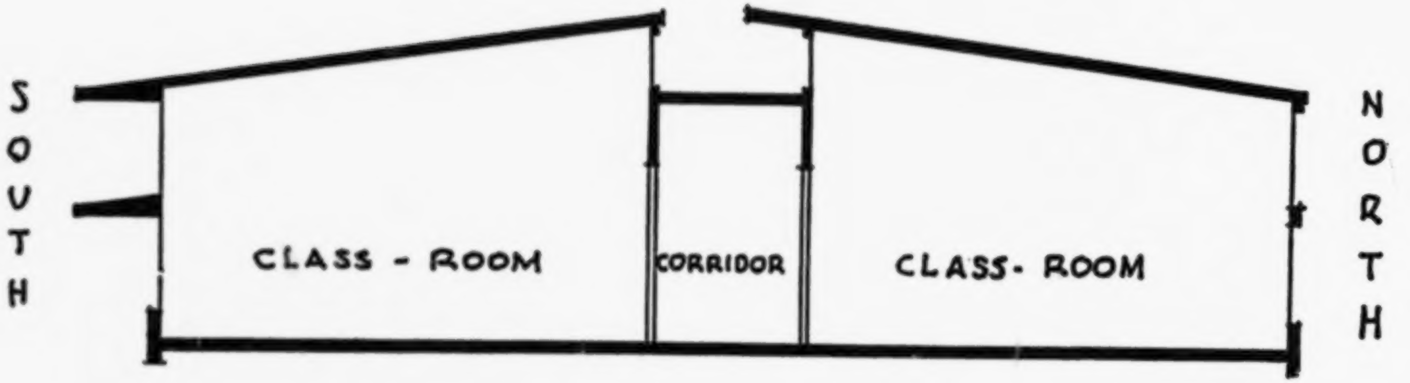
SOUTH
CLASS - ROOM
CORRIDOR
CLASS- ROOM
NORTH

FIGURE 3
NO SCALE

Language arts-social science rooms. Language arts-social science rooms should have an approximate area of 750 square feet.

Math-science rooms. Math-science rooms should have an approximate area of 960 square feet and should be equipped with work tables at windows. The work tables should be equipped with fuel-gas outlets and electric receptacles and should have storage space underneath.

Library facilities. The library should consist of conference rooms, work room, stock room, and reading room. There should be at least two conference rooms, each of them not less than 80 square feet in size. The work room should be about the same size as a conference room and should be equipped with a sink. The size of the stock room is governed by the number of books that it is anticipated the library will contain. Special attention must be given to the floor construction of the library, as stock rooms have a particularly heavy live load. The reading room should contain at least 2,000 square feet of area, should be well lighted (from three sides if possible), and should have cross ventilation.

Auditorium and music rooms. The auditorium and music department should be considered as one unit. An auditorium should be sized so as to seat 50 per cent of the population of the school at once. It is recommended that the auditorium have no windows at all but be equipped with mechanical ventilation. The music department should be located near and adjoining the stage of the auditorium and should be on the same level. There should also be an entrance to the music department to avoid the necessity of traversing the auditorium to get in and out of the music room. Practice rooms should be located between instrumental and vocal rooms. Adequate storage facilities for band instruments, uniforms, and stage scenery are required. If space permits, a work room for the making of scenery and "props" is desirable.

Gymnasium. In a junior high school, the gymnasium should be lined for a junior high school basketball court; i.e., 42′ by 74′ outside lines. If the gymnasium is large enough to contain a standard court (lined 50′ by 85′), it would be advisable to line in two smaller courts, running crosswise. It must be kept in mind that many of the students at a junior high school are not physically developed enough to play on a full-sized standard court. An auxiliary gymnasium, about 20 per cent of the size of the main gymnasium, is an important adjunct to the gymnasium department. It can be used on rainy days by girls, when boys are using the main gym, and vice versa; it can also be used for health instruction. In connection with the gymnasium, there should be locker rooms (basket system recommended), shower rooms, and drying-dressing rooms. In connection with the athletic department, adequate toilet facilities should be provided. It is advantageous to have outside entrances to toilet rooms so that these facilities may have community use for vacation period recreational groups.

Lunchroom. The lunchroom should be sized to accommodate all the students in at least three settings, allowing at least 15 square feet for each student at any one setting. One ten-foot counter will serve two hundred people, and the required service area is 12 square feet for each foot of counter length. In the dining area movable furniture should be used, thereby providing additional space for community uses. There should be provided also adequate refrigeration for storing perishables and other adequate storage for dry subsistence. It is quite important that the dining area be completely separated from the food preparation, cooking, and serving centers by walls. Special toilet facilities should be provided for the lunchroom employees. The lunchroom should be in a one-story area and should be raised above the ground so that crawl space, with access to piping, is available under the floor.

Home economics department. The home economics department should occupy an area of not less than 3,040 square feet for a two-teacher unit. The recommended arrangement is a foods laboratory on one side and a clothing laboratory on the other, these two areas separated by a common classroom and home-living unit and equipped with a domestic type washing machine.

Related arts department. For economical instruction, the related arts (shop) areas should be combined in one room so that there will be between 50 and 60 square feet of space per student. The proportion of width to length of this area should be three to four.

Toilet facilities. Toilet facilities should be well above the ground, well ventilated, and should have walls and floors of a hard vitrified material. The location of these facilities is more important than the number of individual toilet fixtures. A student should not have to walk over 125 feet to the nearest toilet facility. It is very essential that certain of these facilities be accessible from the outside for the use of the community on occasions when the school building is closed.

HIGH SCHOOL

General requirements. The high school should be limited to twelve hundred students and should be a one-story building for up to eight hundred students and a two-story building for more than eight hundred. The shop, gymnasium, lunchroom, auditorium, and music department should be in a one-story area. The over-all requirements for a high school are very similar to those of a junior high school but more highly developed and specialized.

The sizes of language arts-social science rooms, math-science rooms, library facilities, auditorium and music department, and lunchroom, and the general requirements of each of these departments, are the same as those required for the junior high school.

Gymnasium. The gymnasium should have a standard-size basketball court, but otherwise the facilities are the same as for the junior high school. If the school approaches the twelve hundred (maximum) size, there should be two gymnasiums—one for boys and one for girls—unless the auxiliary gymnasium is used. Inasmuch as no stadium is contemplated, visiting athletic teams should be assigned their own shower and toilet facilities. The auxiliary gymnasium is an important adjunct to the high school, as, in addition to the uses previously referred to, it can be equipped with a low stage (not over 12 inches high) and used by the English department for dramatics.

Home economics department. The home economics department should have double the facilities that are recommended for the junior high school.

Related arts department. The related arts department (shop) will consist of separate area shops instead of one general shop as recommended for junior high schools.

Rooms for specialized study. There should be additional special rooms for physics, chemistry, and electricity, equipped as the math-science rooms but with compressed air and Knightware or equal sinks.

Business education classrooms. Special classrooms are needed for the commercial department; namely, typing, bookkeeping, shorthand, and office-practice rooms.

COMBINATION TWELVE-GRADE SCHOOL

Twelve-grade schools are simply a combination of the facilities required by the elementary, the junior high, and the secondary schools in the proper proportions. It has been found advisable to separate the classroom area of the younger pupils (the first six grades) from the area used by the older pupils. Inasmuch as these consolidated schools are usually needed in rural areas where land values are comparatively low, one-story buildings are recommended.

Construction Details

A. Types of Construction

During a recent survey by *Engineering News Digest*, it was found that the cost of school buildings varied from $6.99 to $21.50 per square foot. Obviously, this range reaches from minimum quality non-fireproof rural school buildings (containing minimum facilities) through the most elaborate multi-story completely fireproof buildings (fully equipped and having special scientific and vocational courses in addition to the regular academic courses).

1. Low cost, non-fireproof building

The modern trend is toward one-story buildings, particularly for elementary schools. This type of building virtually eliminates fire hazards, as exits may be made at ground level at any point; consequently, frame construction or frame and brick-veneer construction with wood roof is acceptable. Generally, a building of this type consists of a reinforced concrete floor slab on fill, wood-bearing walls, wood roof framing and sheeting, the interior finished with car-siding or one of several types of wallboard material available on the market. The cost of this type building, excluding special equipment or fixtures but including recommended standards for toilet facilities and wiring, may be as low as $6.50 per square foot.

2. Semi-fireproof building

   This type construction is also well adapted to the one-story school building, as described above. The foundation is usually of concrete with a concrete floor slab on fill; the framework is of light, unprotected steel columns and beams with light steel roof joists; and the roof is of either steel, gypsum board, or wood roof-deck material over which is applied the conventional tar and gravel coating. Interior and exterior wall construction is usually of structural tile with either glazed finish for permanence (if money will permit) or unglazed finish with exterior facing material, generally of brick. Windows and exterior doors should be of steel and hollow metal for permanence. Buildings of this type will cost approximately $8.50 per square foot in this section of the country.

3. Fireproof structure

   Fireproof construction is seldom used except in buildings of more than one story because of the considerably greater cost. In this type construction reinforced concrete or structural steel is generally used. Exterior walls for this type of building usually consist of 4-inch brick and 8-inch hollow-tile backing. Interior partitions are usually of 4-inch and 6-inch hollow-tile construction, and interior finishes are usually plaster throughout, with suspended plaster ceilings. The cost of this type of building is approximately $11.50 per square foot.

4. Single and multi-story units

Wherever sufficient land is available and school space requirements are not too great, one-story buildings offer the advantages of:

a. Fire safety
b. Low-cost construction (as outlined above)
c. Minimum space requirements for corridors and saving of space and costs of stairways
d. Locating entrances and exits where there will be minimum disturbances to other rooms.

Where ground space is limited or school space requirements are unusually large, a two-story building may be indicated. This immediately involves fireproof construction and numerous enclosed stairways, thereby getting into the higher cost brackets. Two-story or higher structures are considered suitable for junior-high-school and high-school purposes but should be avoided for elementary schools; and school buildings of more than two stories should be avoided except in the most extreme circumstances.

5. Standards of design

Insofar as design of the structure, foundations, floors, etc., are concerned, these problems are best left to the architects and engineers. Standards of design for live loads in all types of buildings have been established by various technical societies and political divisions having control of such matters.

Foundation requirements vary from the simplest type continuous grade beam up to and including concrete piling and must be especially engineered to suit the particular requirements of the building location.

Below is a summary of live load allowances for various parts of a typical school structure, according to national and local building codes:

School classrooms	40 pounds per square foot
School corridor	100 pounds per square foot
Auditorium (fixed seats)	50 pounds per square foot
Auditorium (movable seats)	100 pounds per square foot
Gymnasium	100 pounds per square foot

B. Orientation and Fenestration

In past years school design has been made with the thought of utilizing window areas as a primary means of lighting and ventilation for those areas of the school in which students must congregate, especially the classrooms. The lighting achieved from this means is referred to as natural lighting as opposed to artificial lighting provided through electrical lighting fixtures.

Both natural lighting and ventilation are difficult to control. It imposes upon the classroom teacher the responsibility of proper window adjustments to accomplish adequate ventilation and the adjustment of shading devices on windows to obtain maximum lighting efficiency without disturbing glare conditions.

Current design practice provides excellent artificial lighting and dependable mechanical ventilation systems eliminating the need for window areas. The advent of completely air-conditioned schools and the recognition of increased hazards from large glass areas in case of disaster have further minimized the need for large window areas.

Where windows are to be used as a primary source of lighting and ventilation the following rules should be followed:

1. The building should be oriented facing either north or south, preferably north to utilize the maximum benefits from the sunlight. This will also provide optimum ventilation from the prevailing SE/SW winds.
2. The window area should not be less than 20% of the floor area.

3. The windows should extend as near to the ceiling as possible and should vary in height above floor level according to the size of children but in no case closer than 30 inches for safety.
4. The type windows selected should permit opening at both top and bottom. The projected type window is perhaps the best type since they can permit nearly 100% opening which is sometimes necessary for adequate natural ventilation.

Orientation and fenestration lose their importance where school designs provide for good artificial lighting and mechanical ventilation.

Insurance Rates

The School Board should analyze the costs of providing fire insurance for the different types of buildings mentioned above, as this might have some bearing on the initial cost. Specific insurance rates cannot be quoted here because rates on the different types of buildings vary considerably in different areas of the state and in urban and rural areas. It is safe to say, however, that the insurance rate for the non-fireproof building will be more than double that of the fully fireproof structure.

Again, where the School Board has a number of buildings of varying types of construction already insured, the addition of another building representing only a fractional part of the total insured may not affect the over-all cost of the insurance to an appreciable extent.

Experimentation has indicated the advisability of seriously considering complete climate control of school buildings. It is possible to construct a large compact school completely air-conditioned at just about the same cost of the same sized traditional finger type school building and that increased efficiency, increased use of the facility, and reduced maintenance cost will very nearly balance out the cost of operating the air-conditioning.

CHAPTER FOUR

General-Purpose and Special School Rooms

Classrooms in General

It is obvious from close observation of the situation that there are today many structurally sound but antiquated school buildings, that the design of a classroom as the basic unit of a school must be such as to be adaptable to future possibilities of change in curriculum and class sizes. Such cognizance of change will lead to designing schools with allowances for expansion or contraction, for changes in curriculum and population.

To meet current needs in the educational program, the classroom must be more than an engineered enclosure; it must offer a pleasing and homelike atmosphere. Such a classroom can be achieved in part by use of lower ceilings, drapes and plantings, and furnishings that are in scale with the child. The classroom should be planned for immediate entry from the corridor and should be connected to the outdoor play and work areas.

Three space functions can be generalized to cover classroom uses:

1. Teacher-student discussion and recitation
2. Student activity and experimentation work
3. Display and exhibition of student work and reference materials

To satisfy these space-function requirements, the best answer to date has been the square-shaped "daylight classroom."

The activities of the classroom demand the following facilities, which are basic in classroom design:

1. Work benches and storage for the laboratory facilities of the classroom
2. Seats and desks or tables for students and teachers to use in discussion and study activities

3. Display space, tack boards, chalkboards, reference book space
4. Storage space for personal and class materials and equipment

Lower Elementary Classrooms (Primary Grades)

Primary classrooms (Grades 1, 2, and 3) should, by all means, be on the first floor level, and each room should have an outside entrance.

These classrooms should contain 30 square feet of floor space per pupil, with an additional 200 square feet of work space; however, a minimum of 20 square feet per pupil has been found satisfactory.

It is recommended that the primary room be almost square but that the work space area be offset where general structural plans and budgetary limitations will permit.

The room should be so oriented as to allow the sun to reach into the room at some time during the day. There should be an abundance of both natural and artificial light, uniformly distributed to allow at least 30 footcandles of light in all parts of the room for any time or condition. The light should be controlled in such a manner as to eliminate all glare. Windows for supplying natural light should be low enough to permit children to look outdoors.

The room should contain sufficient electrical outlets to provide for a clock and an inter-communication system. In addition, there should be a double convenience outlet at or near the front and the rear of each room for projectors, radio, phonographs, and decorative lighting.

Provisions should be made for a toilet and a lavatory for the girls and one of each for the boys, these to be located between or near the classrooms.

Built-in work benches and a sink should be provided in the work area of each room, and each should contain recessed lockers or other types of storage facilities.

All surfaces of the room should be of approximately the same color values so that variation between dark and light areas is reduced to a minimum. Such colors should be bright and cheery, with no more than three hues to a color scheme. The ceilings should be of some type of acoustical material, and the floors should be finished in a light color. Chalkboards should be of light-colored material, preferably pale green, and at least 14 feet long; and tack boards of approximately the same area and tint should be suitably located in the room.

The room should also contain a teacher's closet, with shelves for books and equipment and space for the teacher's personal effects.

Upper Elementary Classrooms

A. Size and Shape

The traditional classroom (24′ by 32′) could house only one activity, that of recitation; the elongated room (24′ by 40′) could house two poorly controlled areas, recitation and work space; the square-shaped classroom allows for three flexible, controllable areas—recitation or demonstration, work and exhibition, and library space.

The upper elementary classroom, particularly where the class remains in the same room, should have an area of 30 to 40 square feet per pupil. However, 20 square feet per pupil has been found satisfactory as a minimum. Ceiling heights should be between 10 and 14 feet.

B. Storage Space

Storage considerations at this grade level constitute a problem and at the same time offer new solutions for the "daylight classroom." There is advantage in having one vast storage space in that the various types of storage can be worked together into one storage wall, providing ample storage, a sound barrier between classrooms, and a chalkboard and tack board space. There is also the possibility of built-in storage along corridor walls. The advantages of storage-cabinet assemblies as a means of dividing educational spaces are: flexibility, interchangeability, multiplicity of use, and adequate and varied storage.[2]

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[2] American School and University, 1949-50, *School Plant Trends.*

Suggested Type of Storage Space

- For students' books—individual wall shelves
- For students' wrap—individual lockers or group space
- For teacher's books—shelf space
- For teacher's wraps—large closet
- For class supplies—drawer, shelf, and locker space
- For work media—bins, drawers, cabinets, in work area (individual or group)
- For teaching aids—cabinet with lock
- For tools—storage space under or near work table

Note: If windows do not go to floor, good storage space may be constructed below window sills.

C. Plumbing Facilities

There are facilities that must be permanent, such as the plumbing for toilets, drinking fountains, and sinks. It is generally accepted that toilet rooms for upper elementary grades can be centralized and located near the classrooms. Minimum requirements for drinking fountains are one fountain for 75 students in the corridors[3] or one for each classroom for classes which are departmentalized. Other suggestions for upper elementary classrooms are: a work sink of acid-resisting material, electrical outlets, a clock, and a telephone in each room.

D. Wall Treatment

Acoustical treatment of classrooms needs to be considered as a protection from corridor noises, street noises, and noises from other classes, as well as for control of noises within the classroom.

The colors for walls, ceilings, and floors should be chosen for their light reflection and their psychological effect. Bulletin boards and other posting areas should be neutral in color and of easily replaceable material.

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[3] National Council on Schoolhouse Construction, *Guide for Planning School Plants*, 1949.

E. Furnishings

The keynote of classroom furnishings should be furnishings "in scale with the child."

Classrooms for High School Departments

Every classroom should be planned to function effectively as an environment for learning, living, and growing. The classroom space for the high school department should be well-balanced, planned functionally—in response to present needs—and should take into account the observable educational trends. Such a classroom should be designed as a laboratory for purposeful group work, individual study and research, group discussion, and class evaluation.

In such a classroom a floor area of 25 to 30 square feet per pupil is considered desirable; however, if finances are limited, a minimum of 20 square feet per pupil would be satisfactory. On the other hand, if adequate provision is made for an expanded, enriched, and extended school program in which the students may engage in many activities of an exploratory nature, provision should be made for more desk space for texts, reference books, and notebooks; and provision should be made for informal seating in order that small-group activities may be carried on. In small schools, where class sizes vary, the classrooms should be of various sizes in order to meet this need.

In this planning of a functional classroom, providing for a learning and growing laboratory for children, there should be adequate storage cabinets, shelves and filing cases for teaching supplies, materials, and books; and there should be about 16 lineal feet each of tack board and chalkboard in each room.

Areas for Specialized Use

Note: Assistance in the planning of special-type instructional rooms may be secured from the several specialists in the State Department of Education. It is recommended that this service be used in the areas of home living, fine and industrial arts, commerce, agriculture, library science, music, food preservation, primary education, and for lunchroom planning.

Agriculture Department

A. General Factors

1. For agriculture purposes a separate building is considered preferable by many school administrators.
2. The building should be easily accessible to vehicles.
3. The interior of the building should be painted a light color.

B. Classroom

1. It is recommended that the classroom have a minimum size of 600 square feet for a maximum of 16 students, with an additional 15 square feet for each student over 16 in the largest class.
2. Ample storage space for teaching materials should be provided.
3. At least 14 lineal feet of chalkboard should be provided.
4. A bulletin board in a prominent location is essential.

C. Farm Mechanics Section

1. It is recommended that the working area be not less than 1,750 square feet for a class of 16, with an additional 70 square feet for each member over 16.
2. The floor should be of concrete.
3. The blacksmithing area should be separated from the main room by a fixed glass panel or other means that will permit visibility from the main room.
4. A suitable horizontal rack should be provided for lumber storage; it should not be stored around outside walls.
5. Wall space above the work tables should be utilized for cabinets for storage of tools to be used in that particular working area.

6. Working area should be provided for such activities as:
   - Woodwork and farm carpentry
   - Painting, refinishing, and glazing
   - Electricity
   - Plumbing
   - Acetylene welding
   - Arc welding
   - Farm forge work
   - Farm trucks and tractors
   - Farm power and machinery
   - Soldering and sheet metal work
7. A special storeroom should be provided for extra tools, special tools, and expensive tools and supplies.
8. Adequate electrical outlets should be provided. Floor outlets are necessary for larger power equipment.
9. The interior of the room should be finished and painted a soft pleasing tint.
10. A welding booth should be provided, with walls of a sufficient height to permit arc welding without danger to the eyes of students working at other activities.
11. A large outside opening, equipped with an overhead garage door, is essential.
12. A smaller outside door near the rear of the room is desirable.
13. Ample lavatory and toilet facilities should be provided.
14. A bulletin board is necessary.

D. Food Preservation Center

1. General factors
   a. The processing center should be easily accessible to the vocational agriculture department and to transportation.
   b. The inside of the building should be finished and painted a light tint; the walls and ceiling should be washable.

  - c. Adequate natural and artificial lighting should be provided.
  - d. Adequate electrical outlets should be provided.
  - e. Concrete floors with adequate open floor, grill covered drains, are essential.
  - f. Walls should be water tight to a height of at least 18 inches above the floor level.
  - g. Provision should be made for ventilating fans, and for heating the building.
  - h. Ample lavatory and toilet facilities should be provided.
  - i. A bulletin board and bulletin rack are necessary.

2. Food processing room
   - a. It is recommended that this room have a minimum size of 33 feet by 61 feet to include the necessary space for preparation, refrigeration, storage, office, and boilers if all these facilities are included.
   - b. The ceiling height should be at least 11 feet.
   - c. Cross ventilation is important.
3. Smokehouse
   - a. Construction
     1. The smokehouse should be a separate building, easily accessible to the refrigeration unit.
     2. It should be of fireproof construction.
     3. It should be two stories in height, and each floor should have a minimum floor area of 64 square feet.
     4. The smokehouse should be connected with the main building by a covered concrete walk.
   - b. Prefabrication
     1. An adjoining, fire-proof room near the refrigeration unit may be used if an automatic metal smokehouse is preferred.

        2. The size of the room would depend upon the type and size of smoke unit planned.

4. Slaughter room
    a. The slaughter room should be adjacent to the processing room and readily accessible to the refrigeration unit.
    b. It is recommended that it have a minimum floor area of 400 square feet and a minimum ceiling height of 12 feet.
    c. The walls should be of water-tight construction for a height of six feet.
    d. The inside of the building should be finished and painted a light tint; the walls and ceiling should be washable.
    e. Adequate natural and artificial lighting should be provided.
    f. Adequate electrical outlets should be provided.
5. Holding pens
    a. One or more concrete holding pens should be adjacent to the slaughter room.
    b. Each pen should contain at least 64 square feet of floor space.
    c. They should be easily cleaned and drained.

Business Education Department

As a guide in planning specialized facilities for business education departments in the Louisiana schools, the following recommendations are submitted:

Chart Indicating Types and Sizes of Rooms and Approved Furnishings
(based on the school's enrollment)

Enrollment	Type and Size of Room	Type of Students' Furniture
Below 100	1 business education room, 25 x 42	Secretaries desks
100-300	1 typewriting room, 27 x 28	Adjustable desks
	1 combination shorthand-bookkeeping basic business room, 27 x 28	Secretaries desks
300-500	1 typewriting room, 25 x 34	Adjustable desks
	1 combination shorthand-bookkeeping basic business room, 27 x 28	Secretaries desks
	1 basic business room, 25 x 28	Arm chairs
500-800	2 typewriting rooms, 25 x 34	Adjustable desks
	1 combination shorthand - clerical practice room, 25 x 34	Secretaries desks
	1 bookkeeping room, 25 x 34	Large desks or tables
	1 basic business room, 25 x 28	Arm chairs
800-1200	3 typewriting rooms, 27 x 28	Adjustable desks
	1 shorthand room, 25 x 34	Secretaries desks
	1 bookkeeping room, 25 x 34	Large desks or tables
	1 basic business room, 25 x 26	Arm chairs
	1 model office and machines room, 20 x 27	
1200-1800	4 typewriting rooms, 25 x 34	Adjustable desks
	1 shorthand room, 25 x 34	Secretaries desks
	1 bookkeeping room, 25 x 34	Large desks or tables
	2 basic business rooms, 25 x 26	Arm chairs
	1 model office and machines room, 20 x 27	

Other Important Facts to Bear In Mind

1. A business education department should consist of a suite of adjacent rooms.
2. It should be located near lavatory facilities or should have its own lavatory facilities for hand washing.
3. Glass partitions between rooms are no longer recommended, since no teacher is permitted to teach more than one class during a period.
4. Effective sound-deadening materials should be used on the ceiling and walls of typewriting and office-machines rooms.
5. Some chalkboard space is necessary in each room; however, there is need for less chalkboard in the rooms devoted exclusively to typewriting and shorthand than in other business education rooms.

6. Ample built-in, flush-with-the-wall storage space should be provided in each room.
7. Adequate bulletin boards, accessible to pupils upon entering and leaving the room, should be provided in each room.
8. Adequate, well-diffused, and glareless light is necessary for all rooms. Light from the left is usually preferable; however, because of the position of the copy, the light should come from the right in a typewriting room.
9. In view of the fact that many typewriters, adding machines, and other office equipment require electric power, ample convenience outlets should be provided for this purpose.
10. In each typewriting room there should be an adjustable typewriting demonstration stand.
11. In each bookkeeping room there should be at least one adding machine for every 15 students.
12. Cooperative Office Education is an on-the-job training program for high school seniors who plan to work in offices immediately after graduation from high school. They attend regular classes in the mornings and work in the afternoons and on Saturdays if needed.

    Since many problems arise on the job which require individual private conferences, the physical equipment for this course should include an office where the coordinator can confer privately with the students. The office should stimulate a typical office, including a desk and chair, a stenographer's desk and posture chair, an upright copying device and an electric typewriter. The filing equipment should include a flat visible file for the students to keep a weekly record of their earnings and hours worked. A telephone should be included in the office to enable the coordinator to maintain close contact with the training stations between the periodic visits and to make appointments when conferences are needed.

    Although they are not used daily, typewriters and office machines should be available for use by the students in the COE program.

Note: For the most modern and desirable planning of commerce departments, see: The American Business Education Yearbook, Vol. V, "Physical Layout Equipment, Supplies for Business Education"; The National Business Teachers Association and the Eastern Business Teachers Association, New York 3: New York University Bookstore, 239 Greene Street, $3, 1948, 344 pp.

Guidance Department

Widespread acceptance of guidance services in Louisiana has necessitated the inclusion of physical facilities for guidance in new school plants as well as in existing structures.

The counselor is concerned with individual counseling of students and their parents, with group guidance activities, and with coordinating the guidance activities of the faculty. In order to carry on these various activities, tests are administered, scored, and recorded in the students' cumulative folders. Other pertinent data such as grades, autobiographies, personal data, etc., are collected and recorded. These confidential records serve as a source of better understanding of the differences that are inherent in all individuals and enable the entire staff to better meet the students' needs.

The State of Louisiana recommends a ratio of one counselor to each 400 students. This recommendation should be used as a guideline in planning the number of counseling offices needed.

In order to carry out the guidance services of the school the following space assignments are suggested:

1. Counselor's office: 75-100 square feet
2. Reception room and space for occupational and educational information: 300-500 square feet
3. Additional space for clerical workers: 75-100 square feet

These facilities represent the minimum requirements. In many cases additional space should be added for individual or small group testing. Adequate space should also be provided for storage of tests, inventories, and occupational information.

The guidance suite should be so located that it is readily accessible from the main school entrance. It is also desirable that these facilities be located near to, but separate from administrative offices. This arrangement permits easy access to principal's records and at the same time avoids identification of the counselor as a disciplinarian or administrator's assistant.

In planning the guidance facilities, special attention should be given to designing attractive and comfortable quarters that will provide auditory as well as visual privacy. In providing this privacy, all counseling rooms should have floor-to ceiling partitions. The entire suite should be located away from possible sources of disturbance, such as shop facilities and band rooms. Since many counselors are expected to work during the summer months, it is desirable that the guidance suite be located in the area that is to be air-conditioned.

Distributive Education Department

The distributive education student's program is a two-fold process: classroom activity in the morning and on-the-job training in the afternoon. Since students have varied work experiences in their separate work stations much individual activity is necessary. It is desirable that the room be equipped with a store unit and a display window. Hence, more square feet of space is necessary than is found in a classroom for general education.

Many conferences on individual training problems between the teacher-coordinator and the students are necessary. A separate office for this purpose is desirable in order that privacy be assured.

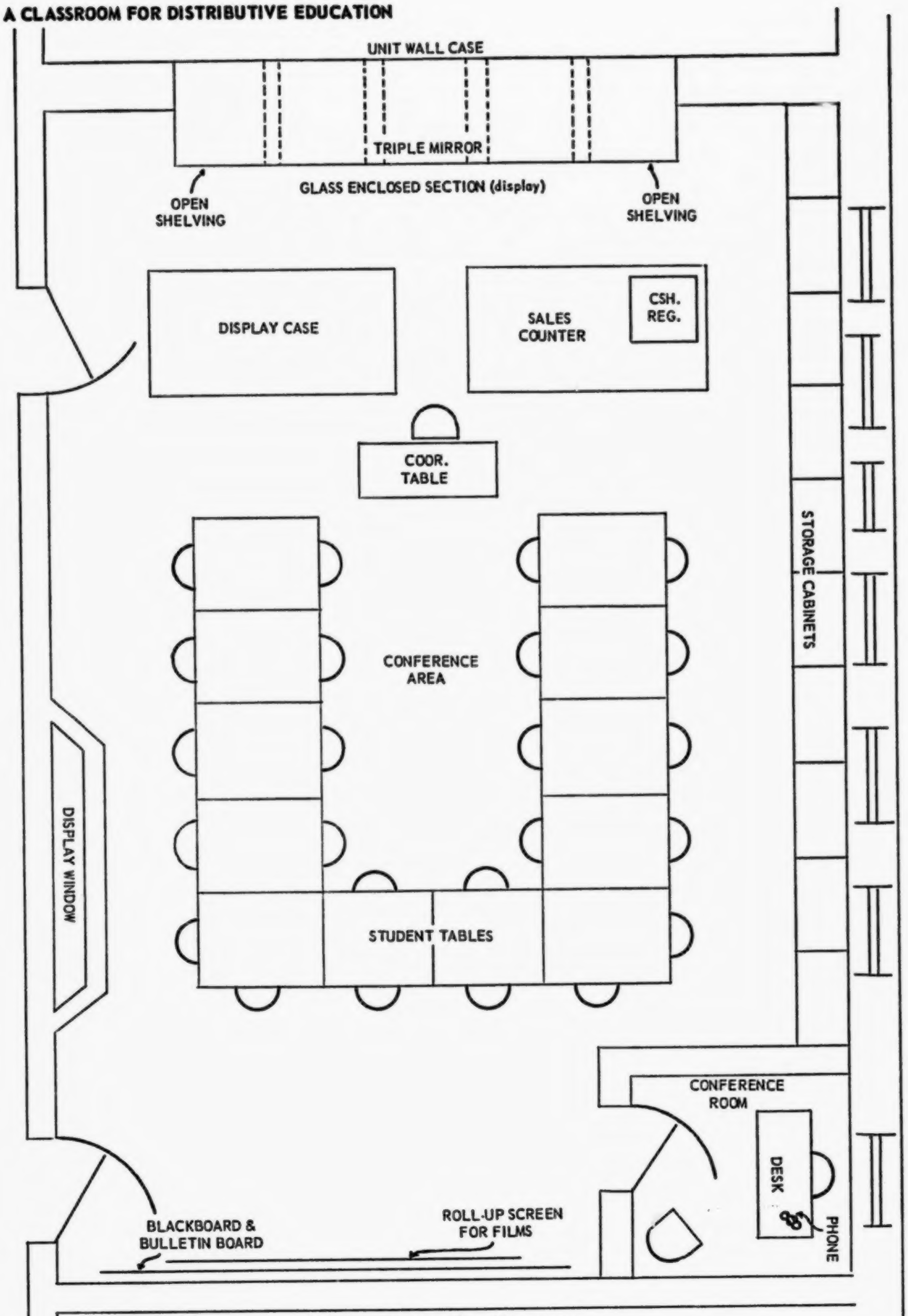
The use of much equipment, visual, layout, etc., suggests the need for a storage room.

If a display window is included with the room plans it should be constructed to face the corridor. A well-planned display will attract attention of the students and will tend to increase student interest in distributive education.

Filing cabinets for students to keep instructional materials adds to the utility of the classroom. A blackboard and a bulletin board are necessities.

A floor plan is attached as an example of good construction.

A CLASSROOM FOR DISTRIBUTIVE EDUCATION


UNIT WALL CASE
TRIPLE MIRROR
GLASS ENCLOSED SECTION (display)
OPEN SHELVING
OPEN SHELVING
DISPLAY CASE
SALES COUNTER
CSH. REG.
COOR. TABLE
CONFERENCE AREA
STUDENT TABLES
STORAGE CABINETS
DISPLAY WINDOW
CONFERENCE ROOM
DESK
PHONE
BLACKBOARD & BULLETIN BOARD
ROLL-UP SCREEN FOR FILMS

(957 square feet of floor space)

Home Economics Department

The home economics department should be planned to include appropriate space and equipment for teaching all subject matter areas of home economics—foods and nutrition, textiles and clothing, child development, housing and home furnishings, health and home care of the sick, social and family relationships, and management and consumer problems. The department should be well planned, attractive, and inviting. It should represent attainable standards for families in the school and community and at the same time provide an environment in which pupils will be motivated to improve their own homes. It is desirable to have the home economics department as a part of the school building rather than as a separate cottage.

The rapidly changing character of curriculum and teaching methods makes it imperative that a home economics department have flexibility. Ample space must be allowed for changes in arrangement and choice of equipment.

Home economics departments may be planned to include:

1. An all-purpose room (one-teacher department)
2. Separate foods and clothing laboratories
3. Living-dining room

1. All-purpose room
    a. Characteristics
        1. There is only one room plus adequate storage space.
        2. Equipment and furnishings related to all areas of home economics are in one room.
        3. Unit kitchens are provided according to enrollment.
        4. The tables are used for food service, clothing construction, and general class work.
    b. Advantages
        1. Space and equipment are utilized to the greatest advantage.
        2. It is easier for one teacher to maintain.

    3. Pupils may be involved in multiple activities under the guidance of the teacher.

  c. Limitations
    1. This type of department is usually planned for schools in which not more than 16-20 pupils will be enrolled in one class.
    2. Problems related to space and equipment develop when enrollment increases.
    3. There is no space for an additional teacher in case of increased enrollment.

2. Separate laboratories and a living-dining area
  a. Characteristics
    1. Separate laboratories are provided for foods and nutrition and textiles and clothing.
    2. Space and equipment are provided for 24-32 pupils per class.
    3. Each laboratory contains storage space for equipment, supplies, and instructional materials.
    4. A teacher's desk and planning center are provided in each laboratory.
    5. A regular classroom may also be included in the plans.
    6. In large schools, one laboratory or classroom per home economics teacher is needed. The use of these will be rotated.
    7. The living-dining area is shared by all teachers and should be located near the foods laboratory. An entrance should be provided from the corridor.

  b. Advantages
    1. It is easier to handle large classes in this type of department.
    2. Two or more teachers may share the space and equipment.
    3. Each laboratory can be planned for one or two specific areas of home economics.
    4. Rooms are available for increased enrollments.

c. Limitations

   1. Where there is only one home economics teacher, space and equipment are not in use at all times.
   2. There is more space to be maintained.

d. Foods and nutrition laboratory

The laboratory for teaching foods and nutrition should have built-in unit kitchens. The enrollment determines the number of unit kitchens. One kitchen should be provided for each four girls in a class. Each kitchen should include a double sink, range, a minimum of 8 linear feet of counter and storage space. Each unit kitchen should have approximately 15 linear feet—dependent upon the shape of the unit kitchens. Space for a dinette table that is at least 38″ wide and four chairs should be provided for each four girls. The space provided should be adequate for four pupils to be seated comfortably for meal service and for class discussions. There is need for some storage space for general supplies, equipment, and furnishings.

TEXTILES AND CLOTHING LABORATORY

The classroom for teaching textiles and clothing is usually used for teaching several other areas of home economics. In addition to making provision for equipment and supplies related to textiles and clothing and other areas, it will be necessary to plan for a seating arrangement that will be suitable for class discussion.

A LIVING-DINING AREA

A social area is desirable. This room should be adequate in size (approximately 16 x 24 feet) with an entrance from the hallway. This area should be used for conferences, serving dinners, coffees, teas, and other social activities.

RECOMMENDATIONS FOR ALL HOME ECONOMICS DEPARTMENTS

1. The space generally recommended by authorities for clothing and foods laboratories is approximately 1,500 square feet in addition to laundry

and storage space. This will vary according to the enrollment for which the space is planned.

2. The width of a home economics room should be no less than 24 feet; 28 feet would make for greater efficiency. The length of all-purpose rooms and laboratories will vary according to the anticipated enrollments for which the department is planned.
3. A pantry is desirable for all kitchens.
4. Adequate storage space should be planned for all rooms. Items to be stored include:
    a. Instructional materials such as books, magazines, charts, audio-visual equipment, and other equipment and supplies needed for the various areas of home economics
    b. Cleaning equipment and supplies
    c. Food supplies
    d. Dishes, linens, and other items for meal service
    e. Small and large appliances and equipment
    f. Seasonal articles
    g. Tote trays or boxes for clothing construction classes
    h. Garments under construction
    i. Roll-away bed
    j. Ironing boards and irons
    k. Pupils' books, coats, and aprons
5. Laundry equipment should be conveniently located for use by pupils in both the foods and clothing areas. (This applies to a two or more teacher department.)
6. Traffic patterns must be considered in the planning.
7. Materials used for floors must be durable and easily cleaned.
8. Wall finishes should be smooth and in attractive colors.

9. A 10′ to 12′ long chalkboard and eight to ten linear feet of tack board space should be provided in each laboratory and classroom.
10. A chart rail should be provided above the chalk and tack board.
11. Provision should be made for both gas and electric ranges.
12. An adequate hot water system should be provided.
13. A lavatory room is desirable.
14. A fitting area in connection with each all-purpose room and clothing laboratory is essential.
15. All rooms must be properly lighted, heated, ventilated, and screened.
16. In all rooms adequate electrical outlets are essential.
17. Effort should be directed toward attaining a homelike appearance throughout the home economics department.

Industrial Arts Department

1. The curriculum, facilities, and laboratory locations

Industrial arts laboratories should be designed to accommodate a specifically planned curriculum. State or local curriculum guides provide guidance in determining the instructional program. Industrial arts teachers should be included in the planning stage as soon as possible. A pre-planning conference should be held with local school administrators, industrial arts teachers, architects, and the state director of industrial arts.

In the pre-building stage of industrial arts laboratory planning, the thinking of the community must be considered with regard to other educational programs offered, particularly the science, arts, and vocational trade and technical programs.

Laboratories should be planned for the future maximum enrollment for the school even though costs prevent the full building program to proceed immediately.

Various illustrations of decision-making regarding the number and type of industrial arts laboratories for junior and senior high schools can be found in state planning guides. These recommendations specify an action program which reflects the state's philosophy, curriculum, needs, etc.

2. Laboratory locations

In many new school plants industrial arts facilities are located in wings or fingers connected with a hall-type approach along the side of the wing. It is advisable to have the partitions between the laboratories to be of a nonbearing type so that future expansion can be done with ease. In campus-type architecture a separate building is often used.

If at all possible, it is best to locate industrial arts laboratories at ground level. This is advisable because of the necessity to receive heavy equipment and supplies for instruction.

Industrial arts laboratories should have ceilings and walls as near soundproof as possible.

3. Laboratory layout

Space needs must be provided for the machine areas, assembly areas, work stations, tools, and auxiliary rooms such as teacher's counsel room or office, finishing, storage, planning, library, and project storage.

The shape of the laboratory should be rectangular with a ratio of 1:1½ or 1:2. The width of the laboratory should not be less than 30 feet. Transportation or power mechanics laboratories should be wider and include overhead doors to accommodate automobiles and other large equipment. The instructor should have visibility throughout the whole area and glass partitions should be used in offices, planning rooms, etc.

Auxiliary rooms to the main industrial arts laboratory should include classroom, toolroom, office, and finishing room. Toolrooms are not generally recommended because of the more functional "work center" which includes all tools and supplies needed for instruction in the immediate surroundings. If a separate classroom is provided, facilities for darkening the room and provision for visual projection equipment should be provided.

Supply and storage spaces should be so located that unloading from delivery can be made easily. Shelves and cabinets should be provided for these rooms.

An assembly area should be provided where several students can work together for gluing and assembling operations.

4. Service needs

The modern industrial arts laboratory needs gas, electricity, water drainage, radio and TV outlets, compressed air, clock, classbell system, fire alarms, and an intercommunication system. The basic building structure and service system should be designed to permit convenient and economical shifting of internal space divisions.

Services for lighting and heating should be flexible in the several instructional areas of the laboratory. Artificial lighting should be 10 to 12 feet above the floor. This requires 12 to 14 foot ceilings. Ceiling should be of sound absorbing material. Illumination should have a value of at least 40 footcandle power at bench height. Drafting or mechanical-drawing classes or areas should have more illumination at the drawing table height, not less than 50 footcandle power.

Natural lighting should be used to best advantage. Too many windows in an industrial arts laboratory or locating windows too low to the ground prevent adequate use of the wall for tool panels and displays. Venetian blinds or light reading glass are effective to control outside light.

Ventilation systems for industrial arts laboratories should be separate from the rest of the school. Unit-type heaters mounted near the ceiling are generally suitable. Radiant floor heating is advisable in auto mechanics laboratories.

A drinking fountain and washing facilities should be provided within the laboratory near the school corridor entrance. Toilet facilities should be located nearby. Door locks should be master-keyed.

An abundance of well-distributed electric outlets should be provided to meet the challenge of a changing program and pupil needs. Conduits for machines should be laid before the floor is poured and allowed to terminate at floor level in covered flush-type outlets. Wall race-ways should contain 220 volt a.c., three phase, and 110 volt a.c., single phase.

5. Varying space needs

Space needs for the industrial arts area vary according to the kind of laboratory and according to the kind of laboratory and activities selected for instruction. The following recommendations are approximate estimates, based on 24 students per class, to serve as guidelines in determining space requirements (square feet) for various industrial arts laboratories. They are as follows: transportation or power mechanics (3,000); electricity and electronics (2,400); graphic arts (2,400); drafting (2,400); general woods (2,400); comprehensive general industrial arts (3,000); handicrafts (2,400). Additional space needs of 200 to 250 sq. ft. should be provided for storage in each laboratory. Special rooms, such as a cleaning room for power mechanics, a test booth for electricity and electronics, a photo laboratory for graphic arts, and a finishing room for woodworking should also have an additional space of from 150 to 250 sq. ft. When facilities will be used for evening school, additional storage space should be provided of approximately 200 sq. ft.

Equipment should be arranged in a manner so that there will be a natural flow from one operation to another. Aisles of travel should not be less than four feet in width and the spaces between benches and machinery should be not less than three feet. There should be at least four to six feet of clear floor space in front of tool panels or checkout rooms.

Modern laboratory planning indicates that grouping instructional activities of a related nature in specific locations in the laboratory reduces unnecessary traffic flow. Within these locations are found appropriate benches, storage cabinets, tools, machines, materials, reference books, pictures, charts, and project displays—complete in itself. This arrangement is often called a work center. The work center provides an atmosphere of the type of work done and stimulates the student to do high quality work. A planning area or center should be included for each laboratory, either as an integral part of the laboratory or in an auxiliary room nearby. This planning area or center should include drawing facilities, storage cabinets, library, reference and planning materials, projector equipment, and demonstration facilities. This area often includes the instructor's desk and his materials. If enclosed the planning area should have glass partitions. Other centers could be foundry, gluing, welding, etc.

6. Laboratory equipment

The laboratory equipment in industrial arts should be single purpose and protected by adequate guards. Simple, functionally designed equipment, either mobile or stationary, with an individually operated electric motor is desired. Where power is to be transferred, V belts are preferred.

Each machine should be equipped with a start-stop breaker (magnetic or thermal overload) type switch so that it can be controlled independently.

The switch box should be located within easy reach of the operator.

7. Floors

Hardwood (maple) floors, tongue and grooved, are effective where woodworking equipment and tools are used. Concrete is needed in the hot-metals and transportation or power-mechanics areas. Resilient tile such as plastic asphalt tile, cork, mastic, and rubber can be used in the office, planning, electricity-electronics, drawing, and graphic-arts spaces.

8. Display

Lighted display cases (recessed in the walls with a minimum of 30 cubic feet) should be provided to show industrial arts students' work in the main corridors of the school. Adjustable shelving should be used for maximum flexibility. The display area should be provided with locks.

9. Health and safety

All machinery should have adequate guards and should be electrically grounded. Proper fire extinguishers should be placed in danger areas. Hoods and exhaust systems should be installed particularly where hot metals, live engines, spray booths, etc., are used. Dust collection systems should be installed on wood-working equipment, especially the wood planer, jointer, and belt sander. Finishing booths for ceramics, hot metals, and transportation or automotive laboratories, which require ventilation, are often included in the original bids for the school building and not a part of the "equipment" to be purchased later.

Automatic sprinkler systems should also be installed. Because of the nature of the industrial arts program, acoustical materials should be used to reduce noise. A first-aid kit should be located where it is easily accessible.

Multi-Purpose Rooms (Including audio-visual facilities)

The number of multi-purpose rooms required will be determined by the enrollment of the school.

This room should be large enough to accommodate approximately one hundred pupils and should be made with inside folding walls so that it may be partitioned off into smaller rooms, thus making the room available for two or more smaller groups at once.

The walls should be tinted in a soft shade of blue or green, and the ceiling should be white.

One end of the room should be fitted with a small stage with storage lockers on each side, this end to be used for stage entrance and exit. The other end should have a movable dais with a lectern, for use of speech classes and debate teams.

The wall space not taken up by stage or windows should be made into display space, shadow-box style. Below these indentures there should be drawers and lockers for storage. Between the display cases there should be drop-leaf work tables that can be folded against the wall when not in use.

The room should be acoustically treated, as the classrooms; and it should be equipped with the following: motion picture projector, film strip machine, lantern slide projector, recording machine, two phonographs, two or more typewriters, filing cabinets, equipment for testing sight and hearing, testing machines for driver education, and any other testing devices that the school feels it needs and can afford.

There should be a number of electrical outlets and separate control switches, so that the lighting for any section may be controlled individually.

Music Department

Specific areas should be devoted to the music program in all schoolhouses, regardless of the size of the school. The music area should be a unit, and it should be located near the auditorium stage and convenient to outside access for community use. One of the exterior doors should be of sufficient width to permit the passage of grand pianos and large musical instruments. In planning the area to be devoted to the music program, special provision should be made, if finances permit, for bands, orchestras, a variety of choral groups, and individual instrumental work.

The area should be adequate in size to provide for the varied activities to be engaged in and should be acoustically treated by making the ceilings, walls, and floors sound-absorbent and the doors soundproof. The windows should be so arranged as not to face other classroom areas, thus guarding against sound transmission. The specific area devoted to music should be in keeping with the educational plan which the area is expected to serve, depending on the size of the school and the music program that is planned.

In very large school buildings, it is desirable to provide practice rooms varying in size and from 60 to 80 square feet and special rooms for teaching music theory. In smaller school buildings it may be necessary to teach instrumental and choral work in the same room. Terraced, horseshoe-type floors are desirable; however, they are not necessary.

In any area devoted to music, regardless of the size of the school, there should be built-in cabinets and the like, providing adequate storage space for instruments, uniforms, and other equipment needed in connection with the music program.

Science Rooms

The size and appointments and the number of science rooms should be determined by the size of the school and the kind of science curriculum to be offered. The science curriculum should be based on the science needs of the pupil population to be served. For example, the science program in a rural school, most of whose graduates remain in the community, should be different from the science program in a large urban school from which the majority of the graduates would enter college.

A science room should provide facilities for demonstrations, experimentation, and the use of audio-visual aids; and it should also be adapted to use as an ordinary classroom. Only in larger schools should specialized science rooms (i.e., science rooms equipped for the teaching of only one subject as physics or chemistry) be provided. If a school is large enough to justify two science rooms but not large enough for three or more, it is recommended that only one room be equipped to accommodate the physical sciences (chemistry and physics) and that the other be equipped for biology and general science.

For most schools in Louisiana a flexible general-purpose science room will be adequate. This room should be large enough to accommodate about 30 pupils (40 square feet per pupil). It should be equipped with a teacher's demonstration table with an acid-proof sink, drain, water supply, gas, and electricity. Movable work tables and chairs may serve as desks. Fixed science tables (with acid-proof sink, drain, water supply, gas, and electricity) should be arranged along the wall in the back of the room. Cabinets for storing apparatus and materials should be built in; and if these are not large enough, there should also be an adequate storage room adjacent to the science room for storing chemicals, apparatus, and teaching aids. A shelf should be provided under windows for such activities as seed germination.

As a specific guide in planning science facilities for a school, the following criteria are suggested:

1. The science room (or rooms) should be adaptable to multiple use. Every effort should be made so that all space is used efficiently.
2. Adequate storage space for apparatus, chemicals, visual aids, books, and other materials should be provided. (Wall cabinets and storage closet adjacent to science room are recommended.)
3. A display case for specimens and models should be provided.
4. A hood should be provided in all special chemistry rooms.
5. Water, gas, and electricity should be in the area devoted to experimentation.
6. Tops of tables should have acid-resisting finish.
7. Science rooms should be equipped for use of audio-visual aids.

8. A small room equipped as a photographic laboratory is desirable in some schools.

Art Department

The area devoted to art should be located near the homemaking units and the general shop and if possible the windows should face north. It is generally considered desirable to provide 30 to 35 square feet of floor space per pupil, exclusive of any space used for storage; however, if finances are limited, smaller areas may prove satisfactory. Special consideration should be given to lighting and decoration for high levels of illumination, to control of shades and to suitable conditions for color discrimination.

The art department should be provided with an abundance of storage shelves, drawers, cupboards, exhibit counters, work counters, filing cabinets, picture files, folio trays, unfinished-work storage, cubicles, bookshelves, work sink (with hot and cold water), large tack board area, small amount of chalkboard, drawing tables, large work tables, easels, model stands, spray outfits, paper cutters, and provisions for visual aids. In addition, potters' wheels, kilns, and other provisions for clay modeling are desirable. The art room should be planned as an informal working laboratory rather than as a conventional classroom. Provision should be made for display space for art objects, both inside and outside the classroom.

A number of work centers should be set up in the art room, such as: clay center, wood center, metal center, and weaving center. Adequate storage space should be located near the respective activities. There should be a large bulletin board on which murals could be executed or comprehensive displays arranged. Movable service units, on which various kinds of supplies and equipment can be wheeled to the place needed are useful.

Reference for detailed plans for an art room can be obtained from: Art Education Section, U. S. Office of Education, Washington, D. C.: National Art Education Association, 1201 Sixteenth Street, N. W., Washington, D. C.; National Committee on Art Education, 11 West 53rd Street, New York.

Areas for Use of All Students

Fallout Shelter

With proper planning, all of the "common" areas (auditorium, gymnasium, library, dining, toilets, lounges, administration) may also be adequate for shelter space in time of national emergency.

Auditorium

While the dual or triple use of the auditorium space seldom offers a happy solution, every effort should be made to make maximum use of the auxiliary facilities. In cases where the school is used by the community after school hours, all the parts of the school plant which serve the community function should be grouped together. The theater function often has to share floor space and budget space with other functions, as lunchroom, gymnasium, study hall, assembly hall, social room, and classrooms.

The combination facility should be a result of budget and not of use or enrollment, because in most cases the combination of two dissimilar activities results in both functions being served inadequately.

A. Size and Shape

"A recognized and acceptable practice is to provide a school auditorium to accommodate from one-third to two-thirds of the working population of the school."[4] For preliminary studies, 7 square feet of floor space per seat may be used. A school auditorium larger than 1,000 seating capacity is considered too large; seldom is an auditorium larger than 600 capacity justified. The smaller auditorium (400-600 capacity), designed as a little theatre and to house only a part of the school at one time, has proved very satisfactory because it may be used for a variety of activities—music and dramatic arts, class meetings, community meetings, etc.

B. Windows

The growing use of motion picture equipment in the education program necessitates an auditorium which can be darkened effectively. The need for natural ventilation (where the cost of air conditioning is prohibitive) will necessitate use of a type of window which can be closed effectively against the light without interfering with the ventilation.

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[4] "Assembly Areas," *Time Saver Standards*, Ray L. Hamon, May 1938.

C. Seating

"The best method of seating is the seats fixed and staggered. The rows may be in straight lines, or they may be curved if the floor is bowled. Seats should be about 22 inches wide and a minimum of 32 inches from back to back. No seat should be more than seven seats from an aisle."[4] Upholstered seats give comfort and more uniform acoustics for all capacities, but this is not essential; and, because of the cost, upholstery will generally be eliminated. The aisles should be three feet at the front and should increase 1½ inches for each ten feet of length toward the exit. The orchestra pit need not be used in school auditoriums, but provision for the orchestra must be made by leaving enough flat floor space between the first row of fixed seats and the stage.

D. Interior Finish

The auditorium should be free of columns from the floor. The floor may be of cement, wood, asphalt tile, rubber tile, linoleum, or any material sturdy enough to withstand heavy traffic. Every effort should be made to consider the stage as the focal point and to treat the walls and ceilings (for light and acoustics) so as to focus attention on the stage and not compete with it. Acoustical ceiling and walls should be designed with the aid of an acoustics consultant, for it is of prime importance that performers have the proper reverberation of voice or music for richness.

E. The Stage

The stage should be of ample size, a minimum depth of 24 feet and minimum proscenium opening of 24 feet. "In auditoriums seating as many as 500, the stage depth should be at least 30 feet."[5] It is desirable to use a depth of 28 feet or more and a minimum proscenium width of 30 feet to accommodate large choral and instrumental groups. An accepted practice is to have a minimum free-wing area equal to the stage area.

The stage apron in front of the curtain should be kept at minimum depth, for, like the orchestra pit, a wide apron increases the distance of the audience from the activities on the stage. The proscenium opening must have a flame-proof curtain.

Provision must be made for adequate stage lighting and signaling. Spotlights and floodlights, provided for in the ceiling and in the wall in front of the stage and controlled from stage panels, prove a much better source of face lighting than footlights. Provision should be made, wherever feasible, for projection of sound and sound movies on the stage. It is best not to attempt natural lighting of the stage, for such light is too difficult to control.

The stage floor should be of soft wood which will not splinter when sets are secured to it with screws.

The proscenium opening should be about 20 feet high with the stage ceiling a minimum of three feet above the opening. The best stage designs for a school auditorium recommend a ceiling that will afford supports for and space to lift stage sets out of view. Controls for the scenery, curtains, backdrops, and lights should be grouped together, preferably at the proscenium wall, on one side of the stage or the other.

F. Auxiliary Rooms

It is well, if economically possible, to provide two dressing rooms with benches, costume racks, lockers, and toilets. However, ready access to a corridor from the stage may make available any number of classrooms or locker rooms for dressing-room purposes.

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[5] *Time Saver Standards*, "Assembly Areas," Ray L. Hamon, 1938.

A ticket office and wrap-check space, in conjunction with the lobby, is a necessity if the auditorium is to function properly for school and community assemblies.

It is almost inevitable that a school will feel the need sooner or later for a concession space, and it is well to consider this need in early planning. The lunchroom placed adjacent to the auditorium may be used very satisfactorily for this purpose.

Toilet facilities must be provided for public use. They may be separate facilities, or two school toilet rooms may be made available without opening the whole school building to the public.

A telephone booth should be provided for in the lobby.

A projection booth, when required, should be provided on the central axis of the auditorium in a position so as not to interfere with the comfort and the sight line from any seat.

G. Safety Provisions[6]

a. Ground floor location
b. Use of ramps rather than stairways whenever feasible
(Ramps should not exceed one foot rise in ten feet.)
c. Non-slip floor on ramps, stairways, aisles
d. Exit lighting
e. Aisle lighting
f. Adequate, well-spaced, and well-designed means of egress to the outside
g. Off-street driveway entrance and parking

H. Fire Protection Provisions

Unless the locality has a building code of its own, the auditorium construction should follow the practices set forth in the *Building Exits Code* (National Fire Protection Association) and the *National Building Code*, thus resulting in safe, lasting construction.

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[6] "Placement of the School Auditorium," Stanton Leggett, *American School and University*, 1941.

Gymnasium

The gymnasium is the core of the indoor physical education program and serves as the basic teaching area. In physical and health education, as in any other class, the emphasis is on the individual's development *today*, and care should be taken to provide for such activities and corrective exercises as will serve all the students. The gymnasium should be provided with the same lobby facilities as the auditorium, e.g., lobby, concession space, ticket booth, and public toilets. Most schools will require provision for the display of school athletic trophies where the public may see them.

A. Size

If the school is to enter official competition, the official basketball court will give a starting minimum size to work from. The official court for playing basketball exhibition games for junior-high and senior-high schools is 50 feet by 84 feet. Recommended clearances between court and bleachers or wall is six feet for sides and ends, with a minimum of four feet for each. Provision for seating half the school population is generally sufficient. The most economical seating can be provided with folding bleachers.

Aside from the official court, the determining factor of the gymnasium size is the number of required teaching stations to adequately serve the instruction and supervise physical training for the whole school. ("Planning Facilities for Health, Physical Education and Recreation" is a good reference for determining the number of teaching stations that are desirable. The Athletic Institute, 1956.) Teaching stations can be provided by a motor-driven, floor-to-ceiling, movable partition dividing the main gymnasium into two equal parts. If these two areas are not sufficient space, it is possible to provide the other needed teaching stations with one or more auxiliary rooms; in rare cases, another gymnasium may be provided.

B. Apparatus Room

The most used auxiliary teaching room is the apparatus room, which requires no seating accommodations. It should be about 30 feet by 50 feet by 16 feet[4] and should provide for tumbling, storage of wrestling and tumbling mats, and gym apparatus. When these activities are carried on in the gymnasium proper, storage for the mats and apparatus should be provided for in the equipment room.

C. Remedial Room

The remedial room used for special assignment and corrective exercises, may be of standard classroom size. Tack boards, chalkboards, and storage space should be provided, thus making this room usable as a classroom.

D. Classroom

A physical education classroom need not be a special room. A standard classroom will serve the purpose.

E. Equipment Storage Room

The storage room should have wide doors to allow for the movement of large equipment into and out of the gymnasium. Provision should be made for storing the gymnasium's piano, a necessary feature that is usually overlooked. The piano should have a place in the store room or in a protected corner of the gymnasium. Movable trucks to hold gym mats are very satisfactory. A good, durable, non-slip floor is necessary in the storage room.

F. Floor

As new materials are constantly being developed for flooring, a careful study should be made of what is available before finally settling on the product.

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[4] *A Guide for Planning Facilities for Athletics, Recreation, Physical and Health Education*, National Facilities Conference, Athletic Institute.

The gymnasium floor should be resilient and non-slip. Hardwood floors over subfloor and sleepers is the best gymnasium floor. If the budget is very limited, a good serviceable floor may be had with asphalt tile on a concrete slab. Floors should be provided with subfloor ventilation and expansion joints at all walls. This joint should be covered with a three feet by five inches "L" or metal base to cover the joint and to protect the wall from heavy equipment.

G. Swimming Pool

A swimming pool can provide better exercise for more people in a shorter time than can a gymnasium or exercise room. Because of its tremendous capacity, the swimming pool, which is generally considered a luxury, should have full consideration. The American Association of School Administrators suggests use of the non-competitive, constant-depth pool (42 to 46 inches) as an economical swimming pool, since exercise and swimming instruction should be the prime purpose of a school pool. The municipal pool can be used for competitions. For inter-scholastic competition, a pool should be 75 feet and one inch long and should provide from four to six lanes seven feet wide.

H. Locker, Shower, and Toilet Facilities

The locker room size will be determined by the number of pupils in the school, since a gym clothes locker is provided for every pupil in the school, and enough dressing lockers should be provided for the largest gym class. Good circulation of air through the lockers and provision for floor cleaning under the lockers is of prime importance. It is well to plan for installing ten per cent additional lockers to allow for flexibility in class sizes and school enrollment.

Recommended minimums for storage lockers, for gymnasium clothes, in order of preference of sizes, are recommended as: 7½" by 12" by 24", 6" by 12" by 36", 7½" by 12" by 8". Lockers for street clothes (or dressing lockers) should be larger: 12" by 12" by 72" for secondary schools and 12" by 12" by 54" or 12" by 12" by 48" for elementary schools.[8]

Locker rooms should be adequately ventilated and lighted. Whenever possible, sunlight should be allowed to enter the locker room in such a way as to shine down between the rows of lockers.

Toweling areas, equal to the shower areas, should be provided between the shower and the locker or dressing rooms to keep the locker rooms as dry as possible. Gang showers are recommended for boys and for girls, with one shower head for every four pupils in the class.[9] Twelve square feet of floor area is adequate for each shower head in the shower room. Along with the group showers for girls, one to three *individual* shower stalls (3' by 3' by 6') should be provided.

Toilet facilities in the locker-room suite (based on peak loads) should be provided as follows:[10]

Toilets	1 for each 30 girls	minimum 3
Toilets	1 for each 50 boys	minimum 2
Urinals	1 for each 25 boys	minimum 2
Lavatories	1 for each 20 boys & girls	minimum 3

Each locker room should have a drinking fountain, and each boys' locker room should have a cuspidor.

I. Instructors' Suite

The boys' and girls' physical education facilities should each contain the following facilities for the teachers: office space, lockers, and shower facilities. The logical place for this suite or room is at a point of control near the locker room, shower and toweling room, storage or equipment room, and the outdoor recreational areas.

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[8] "Time Saver Standards," *Architectural Records*, July 1946.

[9] "Guide for Planning School Plants," *National Council on Schoolhouse Construction*, 1946.

[10] "Time Saver Standards," *Architectural Records*, July 1946.

J. The Combination Gymnasium-Auditorium

Two such dissimilar activities as stage performance and a basketball game can never share the same space happily. If combined in one room, neither activity will be conveniently served. The best combination is to plan the gymnasium with the auditorium facilities secondary and temporary, with future plans for an auditorium building. Plans should be made to combine auxiliary elements to ultimately serve both buildings efficiently.

Aside from the fact that the seating on a gym floor can never be satisfactory for stage entertainment, these seats present a large storage problem. Such storage should be planned to facilitate the moving of chairs in and out to change the room from one use to another. The chairs used to seat an audience should be designed to clip together in rows to prevent "panic hazards." Acoustical treatment of this multiple use requires expert attention.

The heating system for the gymnasium-auditorium must be flexible to provide the proper temperature and ventilation for physical education and still operate for comfort when the building is used as an auditorium.

In the elementary school the play space (dependent on the size and needs of the school) can be anything from a gymnasium to a large classroom, or it may be two standard classrooms combined by opening a sliding or folding partition.

It is suggested by the National Council on Schoolhouse Construction that heights, though relative to the size of the room, should be 16 feet to 18 feet for active games.

It is not always true that if the elementary school can afford it they should have a full-size gymnasium. A well-equipped play room, devoted to maximum use by the whole school and the community, is more to be desired than elaborate facilities.

K. Table of Gymnasium Sizes and Types[11]

Type	A	B	C	D	E	F	G	H	I	J	Ceiling Height
I	80'	56'	74'	42'	4'	4'	4'	4'	0	0	20'
II	96'	63'	84'	50'	6'	6'	4'	6'	0	12'	22'
III	102'	65'	90'	45'	6'	6'	4'	6'	0	8'2"	22'
IV	96'	76'	84'	50'	6'	6'	4'	6'	0	15'7"	22'
V	108'	93'2"	84'	50'	6'	6'	6'	6'	15'7"	15'7"	22'
VI	104'	104'	84'	50'	10'	10'	6'	6'	24'	24'	24'
*VII	132'6"	96'	50'	84'	6'	6'	6'	6'	35'3"	35'3"	24'

*Game court and two teaching-station courts run across the long dimension.

Type	No. & Size of Teaching Stations (provided by movable partition)	Approximate Seating (with folding bleachers)	No. Tiers of Seating.
I	2-50' x 40'	0	0
II	2-63' x 48'	225	7
III	2-65' x 51'	265	5
IV	2-76' x 48'	500	9
V	2-93'2" x 54'	1000	9
VI	2-52' x 104'	1500	14
VII	3-96' x 44'2"	2500	20

No. I is recommended for elementary schools.
No. II is recommended for junior high schools.
No. III is recommended for high school girls.
Official court for exhibition games is located in the center of the gymnasium, at a right angle to the length axis.

Library

The library unit should include: (1) the *main library*, for the book collection; (2) *conference room*, for group work and discussion; (3) the *librarian's workroom*, where cataloging, repairing, rebinding, etc., may be done; (4) one or more *reading rooms*, with comfortable homelike furnishings (if the size of the school justifies them), (5) *stockroom* for supplies and infrequently used books; (6) space for *screening* and *listening* (audio-visual room); and (7) the *librarian's office*.

A. The Library Room

For reasons of enrollment or finance, most school libraries will comprise only one room, with fixed or movable partitions to effect a desirable separation of activities. However, the library may combine some of the above features, as stockroom and workroom, conference and reading rooms, etc. What follows deals especially with the latter type of library.

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[11] *A Guide for Planning Facilities for Athletics, Recreation, Physical and Health Education*, National Facilities Conference, Athletic Institute.

The position of the library should tend toward easy accessibility to study hall and classroom, with a minimum of interference from corridor traffic. It should be located as far as practical from music room, shop, playground, and street noises; and thought should be given to its future expansion. The dimension, seating capacity, area, and other aspects of the library are fully discussed by Fargo, American Library Association[19] and quoted briefly below:

Formulas for The Reading Room
(not used as a study hall)
Floor space, 20-25 square feet per reader

Seating Capacity	Enrollment	Library Reading Room
6-year junior or senior high school	250 or under	25 (maximum class)
6-year junior or senior high school	250 to 499	10 (minimum class)
6-year junior or senior high school	500 and over	10 per cent of enrollment
Elementary school (single platoon)		40
Elementary school (double platoon)		50
Elementary school (undepartmentalized)		40 (For the large school, multiply this by the number of classes which must occupy the room at any one time.)

Note: The above are approximates, based on the figures most frequently given.

In the internal planning of the library, consideration must be given to natural and artificial lighting, arrangement of shelving and other furnishings for the most effective use and supervision, ample space for class work, and suitable furniture and fittings.

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[19] *The Library in the School*, Lucile F. Fargo, 1947; *Standards for School Library Programs*, 1960.

Standard library equipment should be used, and the features to be considered include:

(1) *Reading tables*, of various heights and patterns, should seat about six readers each and be so arranged that the readers will not face the source of unshielded light. *Chairs* should be strong and simple in design, with sizes to fit the different class divisions. Provision may be made for informal reading.

(2) *Shelving* should be arranged along wall or in alcoves and should not exceed 5 feet 6 inches in height for elementary grades and 7 feet for secondary grades. The bottom shelf should be at least 4 inches from the floor and should be slanted so as to make the titles more legible. Special shelving should be provided for large volumes, for magazines, and for display purposes. There should be no projecting trim or facing. However, the top shelf of the counter height shelving may be slanted and finished with a narrow foot molding so as to provide for the display of magazines or pictures. The library room should have special acoustical treatment, including quiet floors.

(3) Sufficient space for audio-visual equipment and materials, and for their use should be provided in schools where all instructional materials are administered through the library.

B. Library-Study Hall Combination

Although not desirable, a combination library and study hall is frequently necessary, and in such a room proper space must be provided for the greatest number of users at any one time.

C. School-Community Library Combination

Another combination, in use in some rural sections, is a combination school and community library. Where such a combination is used, a separate reading room, with outside door, easily accessible to the public, should be provided for use of the community.

Storage Space

A book storage room should be located not too far from the drive, for convenience of delivering books, etc. It need not have outside light, but it should be ventilated and should be provided with sufficient shelves for convenient storage of books.

Janitorial storage space should be provided on each floor for storage of janitor's brooms, mops, cleaning supplies, etc., and there should be a sanitary sink. The location of these facilities is not so important; they should be worked in where the design of the building permits. Toilets and sanitary facilities, etc., for use by janitors should be provided in the boiler room and not in the storage space. Janitor's desk space, workshop, shower, etc., should be provided near the boiler room. If both sexes are employed, separate toilet rooms should be constructed for them.

Toilet and Sanitary Facilities

For pupils 6 to 8 years of age, toilet facilities should be provided in connection with each classroom. For other children toilet rooms for each sex should be located on each floor; however, in buildings of more than one story, the need for toilet facilities will be greater on the first floor than on the upper floors. In very large schools there is usually provision for special toilet facilities for administrators, teachers, and other school employees. Toilets for public use should be conveniently located so as to be readily available to those parts of the plant used by the public—playgrounds, tennis courts, stadiums, etc. The toilets should be [illegible] be left unlocked when the rest of the school building is locked.

Toilet rooms should have a minimum width of ten feet. Entrances should be designed to prevent visibility from the corridor. If entrances are properly shielded, toilet rooms for the two sexes need not be placed at opposite ends of the building, as has been the traditional practice.

For pupil toilet rooms, the following ratio of water closet fixtures to pupils should be considered minimum:

Elementary Schools	Secondary Schools
One fixture for 30 girls	One fixture for 45 girls
One fixture for 60 boys	One fixture for 75 boys

Note: No less than two water closets should be installed in each general toilet room.

Individual urinals of the floor type, when used, should be provided in the ratio of one to each 30 elementary school boys and one to each 45 high school boys. They should be so installed as to minimize sharp angles and facilitate cleaning. A large floor drain should be provided in each toilet room.

It is desirable to provide lavatories or wash basins in each toilet room, in the ratio of one fixture to 75 pupils. Lavatories should be so placed that students will pass them in leaving toilet rooms. It is desirable that both hot and cold water be provided through one spigot. The basin may be without a stopper. Wash basins should be installed 25 inches from the floor for elementary pupils and 30 inches for high school pupils.

Toilets and sanitary facilities for janitors should be provided in the boiler room. If both sexes are employed, separate toilet rooms should be provided.

School Lunch Department

A. General Suggestions

1. The kitchen of the lunchroom should be easily accessible to the school but in such location that its activities will cause the least possible interference with other phases of the school program.
2. The lunchroom should be readily accessible for delivery.
3. The inside of the lunchroom should be painted a light, restful color or combination of colors.
4. The floor should be constructed of such material as to be easily cleaned.
5. A separate screened entrance and exit should be provided.

6. Adequate handwashing facilities should be otherwise provided.
7. Adequate artificial and natural lighting should be provided.

B. Specific Suggestions

1. *Dining area.* This area should be large enough to seat at one time from one-third to one-half of the school's enrollment. A minimum of ten square feet of floor space should be allowed for each child to be served at any one time.
2. *Kitchen area.* For groups under 500, there should be allowed one and one-half square feet per child, based on the total number served. For groups of 500 or over, one square foot should be allowed for each child, based on the total number served.
3. *Storage area.* The storage pantry should be approximately one-third to one-half the size of the kitchen area and should be adequately ventilated. It should be easily accessible to the kitchen and to outside delivery and should be conveniently located.

   The storage pantry should be provided with adequate shelving. The first shelf on one side of the pantry should be 40 inches above the floor in order that staple foods may be stored below it in metal containers. This shelf should be 18 inches wide, since it is to be used as a receiving area. All other shelves should be 12 inches wide. [illegible] shelves should be 15 inches [illegible] No. 10 size cans. One row of shelves should be 17 inches apart in order to provide space for stacking two tall cans of dry milk. Where floor space is sufficient, shelving should be provided in the center as well as around the walls.

   One-tenth to one-fifth cubic foot of refrigeration space should be allowed for each child served, based on the total number served. For lunchrooms serving large groups (500 or more), walk-in refrigeration is recommended. Rural schools serving 300 or more should have walk-in refrigeration.

A school serving 300 or more lunches should provide an electric beverage box at the serving counter for the storage of milk. The size of the box will depend upon the number of children served. In order to facilitate storage and service of the milk, interior tank of box should not exceed 14 inches in depth.

4. *Relationship of kitchen and dining room.* The relationship of the kitchen and the dining room should be such that the food can conveniently be served and the soiled dishes easily returned. A serving counter and a soiled-dish counter should be provided. The lunch department entrance should be conveniently located in relation to the serving counter, and the exit should be near the soiled-dish counter.
5. *Garbage area.* A screened garbage area should be provided for the storage of garbage containers until the garbage is disposed of in a sanitary manner. Size of the area provided will be determined by the number of children served. For a school serving 300 children, the area should be adequate to hold three 20-gallon garbage cans.
6. *Rest-room facilities.* Rest-room facilities should be provided in the school lunch department, unless otherwise provided. Separate facilities should be provided for white and colored workers.
7. *Clothing lockers.* Individual lockers or adequate closet space should be provided for workers' clothing, such as coats, purses, etc.
8. *Storage for cleaning equipment and supplies.* A closet should be provided for the storage of cleaning supplies and equipment. A mop sink

should be included if not otherwise provided.

9. *Office space.* For convenience of the manager in the performance of her responsibilities, an area should be provided for a desk, chair, and filing cabinet. In schools serving 500 or more, it is advisable to have a small separate room for this purpose.
10. *Provisions for appliances and connections.* It is of the utmost importance that kitchen and dining room equipment and appliances (especially those requiring electricity, steam, and plumbing connections) be purchased or contracted for before actual construction of lunchroom is begun in order that the spaces and the service lines may be of the proper sizes and types and accurately located before being enclosed within the structure. Failure to follow this procedure may result in costly alterations to piping, wiring, etc.

C. Reference

U. S. Office of Education, Federal Security Agency. "Planning and Equipping School Lunchrooms," Bulletin 1946, No. 19. (Washington, D. C.: Superintendent of Documents, Government Printing Office) 1946, 23 pp

First-Aid Room

In most schools a room equal in size to the average classroom, properly partitioned, would provide sufficient space for a first-aid room. If the budget is limited, the first-aid room may be a minimum of 12 feet square, providing space for a hospital bed, medicine cabinet, and scales. In addition, a bathroom is desirable.

Executive's Suite

The executive's office should be on the ground floor, convenient to visitors and properly located in relation to school activities. Comfortable waiting space should be provided, connecting directly with corridor, general office, and administration office. Waiting space should provide adequate seating, bulletin board, public telephone, and, if school is large enough, a separate waiting space for pupils.

The record room should be large enough to store all school records. For high schools this storage space must be fireproof; it is desirable that it be fireproof for elementary schools. Space should be provided in the executive office for a master clock, bell system, and radio and public address system. Some are provided with private toilet room and coat closet also.

If a conference room is provided, it should connect to the corridor and be adjacent to the waiting room. The room should be large enough for faculty meetings, parent-teacher conferences, and community committee meetings. In the absence of a conference room, the school's multi-purpose room may serve for conferences.

In the large schools, such rooms as professional library room, assistant principal's office, attendance office, and guidance suite, are provided.

All rooms should be properly heated and should be well lighted with natural and artificial lighting.

Teachers' Lounge

The purpose of a teachers' lounge is to provide a place where teachers might rest and relax during off periods and recesses when they are not on special duty. The number of teachers in the school will determine the size of this room. In large schools separate lounges should be provided for men and for women teachers. Proper lighting and ventilation, a restful interior, and comfortable furnishings are recommended.

CHAPTER FIVE

Service Systems and Safety Precautions

Common Dangers and Hazards

The tremendous responsibilities assumed by those in charge of our schools, both in the planning of new buildings and in reconditioning and adding to existing ones and in their operations, should be fully recognized by the public. Such hazards as exemplified by disastrous fires, with their ensuing panics and loss of life, must be taken cognizance of and must be guarded against in order that similar errors in construction and similar resulting tragedies and losses of both life and property may be minimized or avoided.

School plants of today present a much more complicated problem because of the many added features and activities; such as, lunchrooms, dormitories, auditoriums, auditorium-gymnasiums, stadiums, vocational training areas, etc. Each added activity brings new problems and different degrees of hazard.

Probably the area of most danger is the auditorium, which in some cases presents all the problems of a legitimate theatre. Second to the auditorium is probably the school dormitory, which is subject to as many hazards as the average hotel.

For recommendations and requirements for safety in auditoriums, gymnasium-auditoriums, and dormitories, reference is made to Sections 25 and 26 of the *Building Exits Code*.

All school housing authorities agree that two stories is the limit in height for school buildings unless ground space is not available.

If ground space is available, the school (particularly the elementary school) should be limited to one story in height.

Construction Problems

A. Fire Resistive Construction

All the new buildings should be of fire resistive construction if possible. As an alternative, as little combustible materials as possible should be used. All hidden or concealed spaces should have effective cut offs or *fire stops*, thus preventing the rapid spread of fire.

B. Frame Construction with Fire Stops and Fire Walls

Frame construction or masonry exterior walls with frame interiors should be restricted to one-story buildings. If the building is of considerable area, every 8,000 square feet should be enclosed in fire walls; that is, approximately ten classrooms should be the limit between fire walls.

C. Corridors

Long corridors are nearly always drafty and contribute to the rapid spread of fire. Corridors should be limited in length to 100 feet. If it is necessary to have a longer corridor, *fire doors* should be provided across it.

D. Fire Doors

Because of the great amount of traffic in schools, doors are objectionable; however, if the proper type of door closer (provided with automatic hold-open device and fusible link) is used on the fire door, this objection is largely overcome in that the door (normally left in an open position) will automatically close when actuated by the fusible link. In no case, however, should fire doors be held open by other means than fusible links, for in so doing the purpose of the doors is defeated.

E. Vertical Openings

Vertical openings (stair wells, pipe shafts, dumb waiters, elevator shafts, light shafts and all other openings between floors) are fire hazards.

1. *Open Stairway*. Probably the most dangerous feature in school construction is the open stairway. Contrary to public opinion, most deaths in fires do not result from actual burns. Investigation indicates that the inhalation of heated and toxic gases is usually the direct

cause of death. Gases of combustion expand and rise vertically, and open stairs provide a direct and easy path for these gases. Unless the occupants have time to escape to a point of safety they will be overcome by these gases.

2. *Fire Retardant Walls to Enclose Stairway.* Regardless of the slight inconvenience in routing students through the building, all such vertical openings should be enclosed in fire retardant walls and should have fire doors to the stairway. The stair enclosure should be considered a zone of safety; and once reached, it should afford protection throughout its depth to the exterior of the building. If doors to stair enclosures must be held open, then checks with fusible links must be used. Up to approximately three years ago all schools were built with open stairs, notwithstanding the fact that local and national codes required their being enclosed in fire walls with fire openings.

3. *Stairway Ending in Long Corridor.* Today many schools are designed so that the stairs end in a corridor on the ground floor, and a long corridor must be traversed before the exterior can be reached. In case of fire on the ground floor, students who are forced into the corridor from a stair enclosure would meet grave danger. Stairs and other exits should be located as remote from each other as practicable.

4. *Double action Doors to Stairway.* Double acting doors, i.e., doors which swing in two directions, do not constitute fire stops. First, they cannot be made smoke tight; and secondly, a draught tends to hold them open. If one could assume that in time of danger he could go in either direction and reach safety and that both means of egress were clear, then double-acting doors may serve a purpose. However, this assumption would necessitate exits in both directions so as to avoid dead ends with only one means of egress.

F. Exterior Stairs and Fire Escapes

Exterior stairs and fire escapes should not be installed in new buildings. Fire escapes are only a means of providing for an already existing deficiency. In many of the existing two- and three-story schools the stairs are centrally located; this presents a situation which can be corrected only by the use of fire escapes or exterior stairs properly located.

Where exterior stairs or fire escapes pass windows or other openings, these openings should be glazed with wire glass (or preferably should have steel fireproof windows) so as to prevent blocking of stairs by flames and smoke issuing from these openings.

G. Exit Doors

All exit doors and all doors in line of egress should swing so that they will not block exit travel. It is very easy for a door to act similar to a check valve and thus prevent egress.

Panic type hardware should be provided for all exterior exit doors. No door in exit ways should have a type of lock which might in an emergency prevent its immediate use.

Formulas for determining the number and width of means of egress are contained in the *Building Exits Code* under each category of occupancy; however, at best, these can produce only an approximation which must be modified or increased to suit each individual building.

H. Lockers

1. Elementary Schools

Should be provided either with individual lockers or wardrobes within the classroom preferably across the rear end of such room. This makes for easy accessibility, especially for the smaller children, and is constantly under the supervision of the instructor.

2. Junior and Senior High Schools

Double tier lockers 12" x 12" x 36" are preferable, the lockers themselves being recessed or placed against the walls within the corridors. (Said lockers should be equipped with combination locks.)

3. Instructor

   An individual locker robe is necessary for each classroom for use by the instructor for his or her personal use.

4. Janitor

   A utility room should be provided on each floor, containing a service sink and storage space to store cleaning equipment. A gravity vent duct should extend upward to atmosphere. A small louvered opening in bottom of door is recommended to induce air circulation.

5. Physical Education

   a. Individual wire baskets 13" long by 9" wide by 9" deep on trucks or racks should be provided for the storage of gym uniforms. (These baskets should be equipped with detachment combination locks which shall serve a dual purpose; namely, baskets and steel lockers.)

   b. Double tier steel lockers 12"x12"x36" should be provided for the storage of street clothes. Number of steel lockers required is dependent upon maximum number of students comprising the class. The locker room should be well ventilated.

6. Laundry Room

   Should be provided with home or commercial type clothes washer and dryer. The amount of equipment and size of the equipment depends on extent of washing required done. The laundering of towels, gym suits, athletic equipment, and home economics linens are items that should be considered. It definitely assures sanitary and hygienic conditions.

Electrical and Gas Installations

The installation of all electrical wiring and apparatus, both for lighting and power, and of all gas piping and appliances should be done in a most approved manner. All work should be done in accordance with the requirements of the National Electrical Code, the Underwriters' Laboratories, and Pamphlet No. 54 of the National Board of Fire Underwriters.

Emergency Provisions

If spaces are planned to house a fallout shelter, stand-by diesel or manual generators, or batteries may be necessary for water and sewage pumps, lighting, refrigeration, to prevent rupture in event of disaster.

Heating Systems, Ventilation, and Air Conditioning Systems

Heating systems and ventilation and air conditioning systems are all sources of fire and means of its rapid spread. If ducts are used in these systems, they should be correctly and very carefully installed with a view to preventing the rapid spread of fire and toxic gases. Adequate means of effectively cutting off the electrical current to all blower motors should be provided. Effective fire doors should be provided at locations as described in Pamphlet No. 90 of the National Board of Fire Underwriters.

A. Boiler Rooms, Refrigeration, Machinery, Transformers

Boiler rooms and rooms containing refrigeration machinery, transformers, or other service equipment subject to possible explosion should be located so as to avoid as much damage as possible in case of explosion or the blocking of exits in the event of an explosion. Rooms containing these items should be effectively cut off from the remainder of the building by fire walls. Entrance to such rooms should preferably be from the exterior, and adequate windows facing away from the building should be provided. These windows would blow out and relieve the pressure in the event of an explosion. If interior doors are used, they should be fire doors equivalent in value to the fire walls surrounding the boiler rooms, etc.

B. Fuel Storage

Proper facilities should be provided for the storage of fuel oil. Tanks should be outside of the building and under ground. Complete data on fuel oil storage can be obtained from Bulletin No. 30 of the National Board of Fire Underwriters. If bituminous coal is used for fuel, there is a possibility of spontaneous combustion; large supplies should not be kept in the boiler room. If liquefied petroleum gas is used, the installation should be in strict conformity with the requirements of the Louisiana Liquefied Petroleum Commission and Pamphlet No. 58 of the National Fire Protection Association.

C. Ventilation Exhaust

Some of the older buildings provide exhaust from room ventilation directly into the attic. Such practice is not approved, because it causes rapid spread of fire. Individual room ventilation, with exhaust fans expelling the air into corridors, is occasionally practiced. This, also, is undesirable because smoke and fumes from a fire area will be drawn into the hall while it is being used as a means of egress. This type of ventilation is practical in basements, kitchens, storage rooms, industrial arts departments, or chemistry rooms, etc.; and the exhaust should be vented outside the building.

Emergency Systems

Natural and artificial ventilation and smoke exhausting systems for a shelter have different criteria; consult a Fallout Shelter Analyst, or OCD guidance in preliminary planning.

Other Fire Protection Measures

A. Storage of Combustible Materials

The storage of combustible materials, such as decorations, waste paper, etc., should be avoided. Proper storage bins should be provided for all combustible supplies.

B. Fire Alarm System and Fire Drills

Every school and allied building should be equipped with an adequate fire alarm system. The alarm devices should be so distributed as to be effectively heard in every room above all other sounds. The alarm sounding device should be distinctive in pitch and quality from all other sounding devices.

Note: Detailed data on fire alarm systems may be obtained from Section 10 of the *Building Exits Code*.

The first duty of the school staff when a fire is discovered is to assure complete evacuation of the building. Fire drills, if properly conducted, not only assure orderly and rapid evacuation of the building but teach self-control as well. To this end, the executives, teachers, janitors, and pupils should submit rigidly to discipline and participate wholeheartedly in fire drills.

C. Automatic Sprinklers

In existing frame school buildings of three or more stories in height it is highly recommended that the corridors, stair enclosures, and other exit ways be equipped with automatic sprinklers.

D. Chemical Fire Extinguishers

Chemical fire extinguishers should be provided in key locations. Chemical extinguishers are intended for first-aid purposes or to prevent the spread of fire; and, if this objective is to be attained, the extinguisher must contain the chemical suitable for the particular type of fire hazard. A soda-acid type of extinguisher is useless on gasoline or oil fires; foam, carbon tetrachloride, and carbon dioxide should be used instead. Fire in electrical machinery or equipment can be controlled only by carbon tetrachloride or carbon dioxide extinguishers. For a grease fire in the lunchroom, carbon dioxide, foam, or carbon tetrachloride would be preferable. Extinguishers should be of a type approved by the Underwriters' Laboratory. Further detailed data may be obtained from Pamphlet No. 10 of the National Board of Fire Underwriters.

E. Standpipe and Fire Hose

Frequently municipal fire protection is inadequate in the vicinity of the school. This is particularly true in outlying districts of many cities and in rural sections. In such instances, the installation of a standpipe system, with 1½-inch approved linen hose attached, offers some fire protection. If properly located, such standpipe system is an aid to fire fighting operations, as it does not involve the obstruction of exits by hose drawn in from the outside. It should be borne in mind, however, that the standpipe is intended primarily as a tool for those who will do the major fire fighting.

Water Supply

All schools should be provided with an adequate supply of safe, potable water approved by the State Board of Health. Public water supplies where available should be used. Plans for new water supplies, or for major changes in existing supplies, should be submitted to the State Board of Health for review and approval before beginning any construction work thereon.

Information on the proper construction of wells and cisterns may be obtained from the Parish Health Unit or from the State Board of Health.

An effort is made by personnel of the local health units to inspect school water supplies prior to the opening of schools. Samples are collected at the time of inspection and submitted to the Board of Health laboratory for bacterial examination to ascertain the safety of the supply. (Any defects found are reported to the Superintendent so that corrections can be made.)

It is desirable that hot water be available for lavatories and showers; however, in lower grades, only warm (not hot) water should be available.

EMERGENCY WATER NEEDS

Special storage tanks, individual containers, sprinkler systems, etc., that may be required for fallout shelters, require attention by qualified authorities.

Waste Disposal

All wastes should be disposed of in a safe and sanitary manner and plans should include facilities for this. Wastes may be grouped into three classes: sewage, garbage, and rubbish. The term sewage includes body waste and other forms of liquid wastes. The term garbage includes all putrescible wastes except sewage and body wastes, including vegetable waste and animal offal. The term rubbish includes all non-putrescible waste unmixed with garbage.

A. Garbage and Rubbish Disposal

Garbage and rubbish storage and disposal is probably one of the most often overlooked phases of school planning. This is especially true of rural schools. Inadequate facilities for storage and/or disposal of such wastes create breeding and harboring places for flies, roaches, rats, and other vermin and insects.

Garbage should be stored in tight metal containers and should not be permitted to accumulate on the school premises. Larger schools are often provided with special screened rooms for the storage of garbage cans awaiting disposal. The room is provided with concrete floors sloped to a floor drain and is equipped with facilities for washing the cans. The room is constructed in a manner to prevent insect ingress as much as possible.

Generally, garbage can be disposed of satisfactorily in one of three ways—public collection, burial, or incineration. In some areas hog raisers contract with schools to collect garbage. This can also be an acceptable disposal method if other provisions of the State Sanitary Code are observed.

Of major importance is the fact that consideration and solution of the problem should be accomplished during the planning of the school. The

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local Health Unit or State Board of Health can be of assistance in such matters and should be called on for advice where needed.

B. Sewage Disposal

For most schools, water supply under pressure is or can be made available so that plumbing can be installed. Where water under pressure is not available, yard privies should be constructed to conform to the regulations of the Sanitary Code. Information as to proper methods of construction may be obtained from the local parish Health Unit or State Board of Health.

Whenever possible, the school sewage system should be connected to public sewage facilities. If a public system is not available, an independent treatment system must be provided.

Septic tank incorporating either filter beds or absorption fields for secondary treatment have been used in the past but are no longer considered an entirely satisfactory means of sewage treatment for schools.

Two types of sewage treatment systems have come into wide-spread acceptance which are much more dependable than the septic tank system and which compare favorably in cost. These are package type "extended aeration" plants and oxidation ponds.

Oxidation ponds have been used successfully for the treatment of sewage for a number of years. They have the advantages of low initial cost and low maintenance cost. The only restriction to their use lies in land availability since they do require much larger areas than do other treatment processes. The pond must be properly engineered to be effective. Generally, they would be sized on the basis of approximately 840 school students per acre of water surface.

"Extended Aeration" type plants have also been used considerably for schools in the state. These plants are actually modified activated sludge plants in which there is no separation of solids from liquids prior to aeration. Such plants are usually sized on the basis of approximately 15 gallons per student and 0.65# day B.O.D. per student. These plants also require proper engineering for maximum effectiveness.

EMERGENCY DISPOSAL REQUIREMENTS

Special problems of disposal may exist during time of occupancy of a fallout shelter. They include disposal of human excrement in kits, garbage and litter which cannot be hauled away.

Plumbing and Fixtures

All plumbing should be installed by competent plumbers and in strict conformity with the regulations of the State Plumbing Code (Chapter 10A, State Sanitary Code) and local plumbing codes. A copy of the State regulations may be obtained from the State Board of Health. All valves should be tagged for identification, and a chart showing details of the plumbing layout should be readily accessible in the custodian's room.

For pupils' toilet rooms, the minimum number of fixtures should conform to the requirements of the State Sanitary Code which reads as follows:

"All schools in the state, public, private, or parochial shall be provided with an adequate number of accessible water closets, urinals, lavatories, and drinking fountains. Separate toilet facilities shall be provided for each sex. The number of fixtures for primary school shall be approximately one water closet for each sixty (60) boys, one urinal per thirty (30) boys, one water closet for each thirty (30) girls, one lavatory for each seventy-five (75) students and one drinking fountain for each seventy-five (75) students. The number of fixtures for secondary schools shall be one water closet per seventy-five (75) boys, one urinal per forty-five (45) boys, one water closet per forty-five (45) girls, one lavatory per seventy-five (75) students and one drinking fountain per seventy-five (75) students. Urinals for females may be substituted for water closets, the substitution not to exceed more than one-third of the total to be provided."

This paragraph also includes minimum requirements for numbers of drinking fountains.

To facilitate building housekeeping at least one service sink should be provided on each floor. This fixture is preferably located in a small "janitor's" closet. Outside hose fixtures (bibs) should be provided on the ratio of one for each 100 feet of building perimeter.

Toilets of ten-inch rim height should be provided for kindergarten and primary grades. For upper grades and high schools, some junior size bowls (13-inch rim height) should be provided. Water-closet bowls should be of vitreous china, should be of the elongated bowl type, and should be provided with impervious open-front seats.

Where water pressure is sufficient, the use of individual flushometer valves is recommended for water closets and urinals. Such valves must be equipped with proper back-siphonage protection (vacuum breakers).

Toilets for public use should be conveniently available to auditoriums, gymnasiums, and other parts of the school plant frequently used by the general public.

Lavatories should be located so that pupils will pass them as they leave the toilet rooms.

Drinking fountains should be provided in the ratio of one to 75 pupils, with a minimum of one to each floor. Drinking fountains should not be located in toilet rooms or attached to lavatories or sinks. Those located in halls and corridors should be recessed into walls where possible.

Recommended heights of drinking fountain nozzles are:

For kindergarten and primary grades	24 inches
For upper elementary grades	28 inches
For junior high students	32 inches
For senior high students	36 inches

Lighting

A. General Statements

Proper light is essential for proper seeing. Modern school planning includes provisions for adequate and proper illumination. This is a simple statement; however, the problems involved in providing adequate and proper illumination are not simple, nor is there general agreement as to what constitutes the best lighting.

Light from the schoolroom may come from the sun (natural light), or it may be obtained by use of various illuminants (artificial light). Considering the almost universal use of electricity as a source of artificial light, only this illuminant will be discussed herein.

Proper lighting involves consideration of much more than area of window glass and wattage of lighting fixtures. A certain amount of light is essential for satisfactory seeing; but of equal or greater importance is the matter of glare, —a quality of lighting where brightness conditions may cause visual discomfort, distraction, or even impairment.

NOTE: See Paragraph 3.5 Tables I and II of the "American Standard Guide for School Lighting" (June 22, 1964) which includes recommendations for limits of brightness ratios.

> "In a classroom the brightness of significant surfaces should not differ greatly from the visual task. The brightness of the surface immediately surrounding the task should be less than the task but not less than one-third the task brightness. The highest acceptable brightness should not be greater than 10 times the task brightness for lower levels of illumination and much less for over 50 footcandles."

B. Natural Lighting

Where natural lighting is to be depended upon as a prime source of light, careful attention must be given to fenestration and skylights to obtain maximum benefits of the sunlight (the source of natural light). In such cases, the Sanitary Code requires a window area equal to at least 20% of the floor area.

For a room exceeding 24 feet in width, unilateral lighting does not provide satisfactory conditions. Proper light intensity using natural light alone in such cases cannot be attained with a practicable ceiling height. Where glass brick or directional glass is used in outer walls, provision for ventilating windows should be made.

Windows extending around the corner of a schoolroom have been found to render an unsatisfactory lighting situation.

In order to prevent excessive glare, it is necessary to use some means of diffusing the light admitted through windows. Directional louvers are preferable to shades. When shades are used, separate shades should be provided for the upper and the lower portions of the windows.

To facilitate supplementing natural lighting with artificial lighting it is desirable to provide separate switches for a row of lighting fixtures on the side of the room opposite the windows. The Code in this case requires at least 15 footcandles of artificial light throughout the room.

C. Artificial Lighting

As a preliminary to discussing artificial lighting, it may be well to give the following definitions.

Footcandles—The commonly used unit of illumination at a given point on a given surface (Quantity of light)

Foot-lambert—A unit of brightness (Quality of light)

Direct lighting—Supply light directly from the source to the visual task

Indirect lighting—Supply light from a concealed source by reflection from ceiling and upper parts of walls to the visual task

Semi-direct lighting—A combination of direct and indirect lighting

Brightness—Luminous intensity caused either by direct transmission of light from its source or by reflection from a surface

The eye readily adjusts itself to its environment when the intensity of light is fairly uniform, but it cannot adjust to excessive differences in brightness within the visual field.

In a schoolroom, pupils may be subjected to excessive difference in brightness; at one time they may be subjected to 65,000 foot-lamberts from a transparent 200-watt lamp, 3,000 foot-lamberts from an overcast sky, 5 foot-lamberts from dark walls, and 2 foot-lamberts from blackboard and dark furniture. Such conditions result in eyestrain, fatigue, and inefficiency.

Brightness differences may be reduced in various ways; e.g., by shielding lamps, using indirect and semi-direct lighting, arranging desks to face away from windows, using window shades, using light-colored furniture, and using light-colored flat paints for walls and ceilings and light-colored chalkboards as a substitute for blackboards.

Provisions for artificial illumination should be adequate and should conform to the provisions of State Sanitary Code.

C. Shelter Lighting Levels

These vary from common areas at 2 fc's to administration areas at 10 fc's minimum.

Liquefied Petroleum Gas (LP Gas)

A. Definition

The term "liquefied petroleum gas" means and includes any material which is composed predominantly of any of the following hydrocarbons or mixtures of them: proprane, propylene, butanes (normal and iso), and butylenes. These gases are known to the general public as butane gas.

Under moderate pressures these gases are a liquid, but upon the release of pressure they are readily converted into the gaseous state. Advantage of this characteristic is taken by the butane industry; and, for convenience, these gases are shipped and stored under pressure in a liquid form. When in the gaseous state, they present a hazard comparable to any flammable natural or manufactured gas, except that, being heavier than air, butane gas creates a greater ventilation problem.

B. Comparative Cost and Heating Value

Liquefied petroleum gas (LP Gas) is sold by the gallon, while natural gas is sold by the thousand cubic feet. Butane gas has a little more than 100,000 heating units (British Thermal Units) per gallon, while propane has a little less than 100,000 B.T.U. per gallon; therefore, the average commercial mixture of propane and butane contains approximately 100,000 B.T.U.

The average content of commercial natural gas is one thousand B.T.U. per cubic foot; therefore, one thousand cubic feet of natural gas will contain one million B.T.U. Thus, on the basis of equal heating units, ten gallons of liquefied petroleum gas is approximately equal to one thousand cubic feet of natural gas.

C. Regulation and Inspection

The Louisiana Liquefied Petroleum Gas Commission has jurisdiction over and regulates the butane industry in the State. The Department of Education approves all plans and specifications of original installations and extensions at schools and places of public assemblage before the work is begun. Field inspectors are provided for assistance in correcting job problems and in making final inspections. Final approval of all installations must be obtained before the system may be serviced with fuel.

All LP Gas piping must be installed by a bonded LP Gas supplier or by a contractor working under the supervision of a bonded LP Gas supplier who accepts responsibility for the workmanship and tightness of the system.

D. Consumer Storage

Adequate storage is extremely important for continuous efficient service of LP Gas, and the size of storage needed for each system is dependent on the total B.T.U. input of the appliances. A common rule in the industry is that the container should be large enough to hold twice the amount of fuel required for the coldest month of the year. A general estimation of the tank capacity required may be obtained by using a 335,000 B.T.U. appliance load per hour for each 500-gallon tank.

In designing for the future, it is recommended that especially constructed propane tanks be installed for use of all LP Gas. Authorities in the industry have for some time foreseen the necessity for use of propane tanks because of the increasing demand and use of butane for chemical production. The propane tank is constructed for a working pressure of 200 pounds per square inch but is higher in cost than the 100-pound working pressure of the butane tank; however, any available fuel may be stored in the 200-pound propane tank.

E. Piping and Condensation

Pipe sizing is of extreme importance in designing the installation of LP Gas, in order that it may be adequate for future additions to the load. Oversizing the supply line is recommended on all installations. Many costly changes in piping have been necessary because the supply line was not large enough to supply enough gas to a system after additional appliances were installed. Where it is probable that the system will be converted for use of natural gas, larger piping should be used.

A diagram showing all piping should be posted in the janitor's room and in the boiler room, and a copy should be kept on file in the principal's office. The dew point of butane is approximately 31 degrees Fahrenheit, and during cold weather it will condense at this temperature. For this reason, all piping must slope downward toward the tank in order to allow the liquid fuel to revaporize before reaching the burner tip.

F. Outside Shut-Off Valve

Each LP Gas system should be equipped with a shut-off valve located in the supply line outside the building. This valve should be easily accessible in order that the gas may be shut off from the entire system in the event of an abnormal condition which would prohibit the closing of the tank valve. The person in charge of the building should be instructed as to the location and purpose of this shut-off valve. If it should be shut off for any reason, it would be hazardous to open it again without first ascertaining that all appliance valves inside the building are closed. Careful instructions, such as the following, should be in plain sight near the valve or on a tag attached to the valve, so that its use will not be hazardous:

MAIN SHUT-OFF VALVE FOR GAS SUPPLY

Close valve in event of fire or gas leak. Do not open gas valve without first closing all appliance valves inside.

H. Approved Appliances

Type. All appliances must be of a type approved by and must bear the seal of approval of the American Gas Association. Appliances designed for use of natural gas should not be used for LP Gas nor should LP Gas appliances be used for natural gas.

Venting. Appliances must be of such design that all products of combustion will be vented into the exterior air. All gas fire heaters or heating systems, including gas steam radiators, shall be properly vented to the atmosphere.

The best way to vent a gas appliance is the shortest, simplest, most direct method which will exhaust the products of combustion to the outside air at the highest possible temperature. *Note:* See National Board of Fire Underwriters Pamphlet No. 54 for flue and vent piping details.

Location and ventilation. Appliances should not be installed in locations in which facilities for ventilation do not permit of the proper combustion of the gases. The first requirement for combustion and for venting the products of combustion is a continuous supply of air in sufficient quantity to furnish oxygen for combustion and air supply for the draft diverter. When incomplete combustion occurs because of lack of sufficient oxygen, carbon-monoxide gas is formed. This gas is colorless, practically odorless, and *extremely poisonous.*

Installation. Appliances should be adequately fastened to the floor or wall and so connected as not to induce any stress on the piping or connections. Appliances should not be installed in a basement, semi-basement, or other location where escaping gas may settle or collect. Being heavier than air, LP Gas will not disperse as readily as natural gas; for this reason piping concealed in walls or enclosed spaces is not recommended.

Adjustment and Inspection. Every appliance should be properly adjusted at the time of installation and should be inspected each time burners are lighted. The school maintenance men should be instructed in the proper operation of these appliances. Automatically controlled gas appliances should be inspected at least once every 30 days to insure proper operation of controls and proper combustion of gas. Should any controls become inoperative, the appliance should not be used until the gas company makes the necessary repairs.

I. Precaution Against Gas Leaks

Gas consumption should be checked periodically by reading the tank gauge daily, and a record of these readings should be kept. Watch the daily consumption to see that only normal amounts of gas are used. If an excessive daily consumption is registered, remember three things:

(a) Cut the gas off at the tank immediately.

(b) Notify your gas company.

(c) Do not turn gas on until an experienced gas man has made a thorough inspection and test for possible leaks.

Odor of LP Gas. LP Gas is required to be odorized by the manufacturer in order that its presence may be detected before a sufficient quantity has accumulated to form an explosive mixture. All occupants of a school building should be made familiar with and capable of recognizing the odor of butane. If an odor of gas or an unusual sound, like gas escaping is noted, the gas should be turned off at the tank at once and the gas company notified.

Testing for leaks. A match or other open flame should never be used to test for leaks. A small leak would not be detected with a match, and if a sizable leak exists, the use of a flame may be extremely hazardous. The application of soapy water at all pipe joints would indicate any leaks.

J. Annual Inspection and Testing

Each year, prior to the opening of school, the complete piping system should be inspected and tested for leaks by an experienced gas service man. All piping must be in good condition, properly installed, and free from leaks. A report of the inspection and test should be made by the principal of the school and the gas service man to the State Department of Education and the Louisiana Liquefied Petroleum Gas Commission.

CHAPTER SIX

School Furnishings

ELEMENTARY SCHOOL

Importance of Proper Furnishings

Well-planned furnishings make the school. Too often furniture is purchased for new buildings without regard to the children who are to use it. They often do not fit the furniture and are unable to do their best work in uncomfortable surroundings.

School furniture needs to be selected with care. High quality, serviceable furniture, scaled to the size of the pupils and meeting certain requirements as to color and design, should serve as a guide in the selection of all furniture for classrooms.

The first job of the school at the beginning of every session should be that of assigning to each child a desk of the right height to fit him properly. There should be a 12 per cent surplus of desks and seats in order to fill in the proper sizes for all the children of different heights.

Defective vision and posture may result in a certain measure from the kind of furniture the children use. It is therefore necessary that attention be given to the proper construction of school furniture and its proper placement in the classroom with respect to light.

Pupils' Seats and Desks

Classroom seats and desks should be chosen for their comfort and their contribution to the good posture of the children who will use them.

A. Height

Seat height should be such that the pupil's feet may rest flat on the floor and thus support sufficient weight to relieve the pressure on the under side of the thigh at the front of the seat. When pupil's back is properly supported by the back rest, there should be three or four inches clearance between the front edge of the seat and the inside angle of the knee. To overcome any tendency to slide forward, the seat should slope slightly down toward the rear. The seat should be shaped so as to distribute the weight over a large area without undue pressure at specific points. There should be no rail, ridge, or other obstruction at the rear of the seat which would prevent the extension of the buttocks beyond the back support.

Chairs need to range in height from 11 inches for the first grade to 17 inches for the eighth grade. Desks with solid tops and storage compartments need to range from 21 inches for the first grade to 29 inches for the eighth grade. Both chairs and desks should be equipped with gliders for ease and silence in movement.

B. Type

Pupils' desks should be of a movable and non-adjustable type and should have a wood or blonde finish with a light-reflection value of from 30 to 40 per cent. Care should be exercised against glare or high polish. Light-colored furniture with a dull finish will not cause eye strain and will aid in properly diffusing the light so as to permit better vision.

C Arrangement

Pupils' desks should be arranged to maintain a 50-degree angle between the line of vision and the front line of windows. This ideal necessitates a semi-circular type of seating. The traditional seating, parallel to windows, places some children facing an intense source of light.

Teachers' Desks and Chairs

Teachers' desks should be at least 30 by 40 inches across the top, 30 inches in height, and attractively finished. They should have a lock drawer, a drop front drawer, and one deep and two shallow drawers at the right side.

Other Furnishings

Other types of furniture are needed in each classroom; such as filing cabinets, tables, bookcases, work benches, shelves and storage cabinets. The four-drawer legal-size filing cabinet should be provided for filing pupils' records and other necessary records. Tables should be provided that will seat six or eight pupils on each side, and at least two tables should be provided for each room.

Built-in shelving for books should be of the adjustable type and should be eight to eleven inches in depth. Shelving above the eye level of the seated children is not recommended.

FURNITURE FOR SPECIAL ROOMS

If a shelter space is part of school plant, provide storage space for emergency supplies. The sanitary kit, water, emergency rations, radiation instruments, and medical supplies furnished by OCD require approximately 1½ cubic feet per person sheltered. This may be substantially reduced if water is available from tanks, pipes or wells.

Primary Classrooms

Liberal provisions for movable equipment and many well-designed storage areas are essential for primary rooms, as they must serve a variety of activities.

A work area may include work benches of suitable size, tool cabinets, a hot- and cold-water sink at a convenient height for pupils' use, and storage space for wood and other pupil-activity materials.

Teacher's Corner

The teacher's corner should provide a desk and chair, a few additional chairs for adult visitors and parent conferences, and a four-drawer filing cabinet for pupils' records and teaching materials. A near-by closet should provide space for the teacher's wraps and other materials.

Library Corner

A library corner or alcove, located near the windows, may have window seats (with storage under them), a library table and chairs, and low open bookshelves, suitable in size for the large format books of the kindergarten.

Activity Area

The main activity area for games, rhythms, indoor play, etc., should be adjacent to adequate storage space for large construction blocks, boxes, and other indoor play equipment.

Audio-Visual Aids Rooms

If a visual-aids room is contemplated, it should be well ventilated and large enough to seat at least 40 pupils. The nearest seat to the screen should be no nearer than twice the width of the screen, and the screen should be about one-sixth the width of the room. The chairs should be of the open type, and there should be aisles down each side of the room. A portable chalkboard and tack board for display purposes should be provided in the visual-aids room. This room should be located near the library, as all visual-aids materials are shelved and indexed in the library.

Science and Nature Center

A science and nature center may have a terrarium, an aquarium, space for display of nature and science materials, and space for storage of the equipment needed for simple experiments.

Art Center

An art center may provide wall easels and a table with waterproof top for clay work and finger painting (with a near-by storage for clay), large sheets of paper, and other art-activity materials.

Music Center

A music center may be created at will by moving a small piano or record player to the desired spot in the room. Record storage space should be provided.

Kitchenette

A kitchenette, recessed in the wall, may provide a small stove or hotplate, a refrigerator, a sink, and cupboards (if a mid-morning snack, a hot lunch, and an afternoon glass of milk or juice is not provided suitably by the school's other facilities).

Resting Space

A space for resting, in or adjacent to the first-grade room, is desirable for mid-morning and mid-afternoon naps.

Here folding cots may be brought from storage, lighting may be dimmed, and quiet induced.

Lockers and Storage Space

Lockers opening into the classroom should be provided for students' clothing. Storage space in the classroom should include cabinets under window seats and work counters, tool cabinets, open cubicles for unfinished pupil projects, an exhibit case, special drawers or cupboards for paper and for large equipment, and drawers for games, toys, and other materials.

Toilet and Lavatory Rooms

Toilets and lavatory rooms should be accessible both from the primary rooms and from the outdoor play area. In a single toilet room there may be two separate stalls for two "baby-size" toilet bowls. Toilet-stall doors and the partition between the two toilet areas should be about four and one-half feet high, to facilitate supervision. A sink for hand washing should be placed convenient to the toilet room and located for easy teacher supervision.

Science Room

Provision should be made in the elementary school for a seventh- and eighth-grade science room. The furniture in this room should be of the movable type, and sinks should be along the wall. Low tables and stools are recommended, the furniture should be of the same general type as recommended for classrooms. Locker space for storage of science equipment should be provided along the wall. These lockers should have shelving with a depth not to exceed 12 inches and glass doors for protection. Shelving should not exceed a height which would enable safe handling of equipment by the pupils. There should be specimen cases, mice enclosures, etc. Microscopes and a fixed screen are recommended for the showing of slides or movies.

Library

A centrally located library is essential in an eighth-grade elementary school. Library furniture and equipment should be light in color, should contribute to ease in obtaining books and materials, and should be designed for durability. Slant-topped and/or flat-topped tables which seat from six to eight pupils on each side are recommended. Enough furniture should be provided to meet the needs of two average classes. Provisions should be made for seating children of different grades, a range of 20 to 26 inches in table height, with benches and/or chairs to match. Since the book shelving should be of a permanent type, it would be provided for in the construction of the library. Equipment should include a librarian's charging desk; files; space for storage of records, slides, and visual-aid materials; card index files; magazine racks; bulletin boards; book trucks; flat display case; dictionary and atlas on stands; and paintings for walls.

Related Arts

The related-arts room should provide work space for the handicrafts, for visual arts, and for the use of the tools in construction. Desirable equipment will include built-in storage shelves, a movable work bench for every four pupils, reference book shelves, work sink, large tack board area, dark curtains and other provisions for showing slides and films, spray outfit, paper cutter, teacher's desk, filing case, materials cabinet, large tool cabinet, and first-aid cabinet.

Multi-Purpose Room

Generally, the multi-purpose room is the result of an effort to provide for those desirable school and community activities that do not have special space provisions made for them. Special consideration is necessary if such a room is to serve its purposes well. Storage space must be provided for the materials that will be needed by the various groups. This room is sometimes used for audio-visual activities or for music. If it is used for music, it should be isolated and acoustically treated. Outside access is desirable for this room.

Auditorium-Gymnasium

The gymnasium should be approximately 50 feet by 70 feet and should have folding bleachers. Locker rooms are desirable for the elementary school; toilet facilities and shower rooms, etc. should be provided. A storage room for athletic equipment should be directly accessible from the gymnasium floor. For small elementary school, a separate playroom is more desirable than a combination auditorium-playroom.

Chorus and Band Room

A chorus and band room should provide 25 square feet of floor space per pupil, and special attention should be given to built-in wall cases and adequate storage for instruments, music, etc.

Since this room is to provide for activities not especially adapted to the regular classroom, furniture and equipment must be planned for the various activities for which the room may be used. Folding chairs of a sturdy type, modeled on recommendations for regular classroom furniture, should be placed in this room. The number of chairs needed will depend upon the size of the school. A speaker's stand or desk, a filing cabinet, low shelving for supplies, and several folding tables are needed. A tack board or display space, chalkboard, and other such needs should be provided for in the planning of the building.

Lunchroom

Enough tables should be provided to be adequate to the size of the lunchroom, six to eight persons eating comfortably at each table. Chairs and not benches should be used. The lunchroom should be equipped with steam tables, tray slides, dish storage, etc. Special attention should be paid to sanitary finishes and to proper ventilation. Locker room, toilet, and dietician's office are desirable.

Offices

Office equipment should consist of desks, typewriters, filing space, work tables, book shelves, files, and other standard office equipment, such as master clock, central fire-alarm station, radio, and telephone. If possible, an adjoining storage room and conveniently located toilet facilities should be provided.

Teachers' Lounge

The teachers' lounge should contain comfortable furniture. A small table, several stands for pot plants or small articles, and a mirror, should be included. The amount of seating space or chairs provided for this room will be determined by the number of teachers in the school. Other needed equipment is bookcase, colorful curtains, and good pictures to hang on the soft-tinted walls.

Custodial Room

The janitorial storage room should be carefully planned and should include a separate toilet for the janitor. It should have racks for brooms and mops, locker space for tools, shelving for supplies, and desk and chair.

Infirmary

Two rooms should be provided for an infirmary, one for boys and one for girls. The regular adjustable or hospital-type single bed should be used, two for each room. A small medicine cabinet, a wash-stand type of cabinet for storage of supplies other than medicine, a pitcher, glasses, and stainless steel bedside equipment are required. There should be at least two comfortable chairs and a small desk with a record drawer for use of the attendant. Toilet facilities should be provided in connection with the infirmary.

A small refrigerator could preserve drugs, special health foods, vaccines, etc.

Room For Handicapped Children

(Not recommended for each school but one or two such rooms according to the demand.)

The furniture used in this room should conform to all the standards of furniture for the regular classroom, except that it should be movable and adjustable. Leg rests on chairs are needed for children wearing braces.

A wash basin, drinking fountains, and toilet facilities in conjunction with the classroom are required. Equipment for the hard-of-hearing, such as ear-phones, phonograph, and public-address system, should make up some of the special equipment needed in such a room. The room should be on the ground floor and at a convenient entrance. There should be a ramp instead of steps.

SECONDARY SCHOOL

Today furniture for the high school must be subjected to as careful screening as the blue prints submitted for the building construction. It has been definitely established that best lighting arrangement, best working conditions, best learning, and the safety and health of the children are in direct proportion to the quality, color, design, and comfort of the furniture. Thus furniture selection has become of paramount concern.

General Classroom

The general secondary classroom should be provided with chairs and desks that are selected for comfort and will contribute to good posture of the pupil. It is recommended that the chairs vary in height so that each pupil's feet may rest flat on the floor. Chairs and desks should be equipped with gliders for ease and silence of movement. A surplus of chairs should be provided to take care of variations in sizes of the students.

Other furniture necessary for the secondary classroom is filing cabinets, bookcases, book shelves, and storage cabinets (built in if possible). At least one table, for seating six to eight pupils on each side, should be provided for use in study groups, panel discussion, laboratory study, or model displays.

The book shelves should be constructed in three units, one of which could be placed near the teacher's desk for reserved readings.

Receptacles for waste paper or refuse (preferably the type that have swinging tops) should be provided. There should be a small table for a projector and suitable space for using maps, globes, charts, etc. Pictures, flower stands, and flower receptacles also are important. A good dictionary on a stand is standard equipment, as is also green chalkboard and a suitable tack board.

A fire extinguisher should be readily available to each room.

Audio-Visual Aids Room

In case a special room is set aside for audio-visual education, the chairs should be strongly built and should have wide arm areas. A sturdy carrier on rubber wheels, chalkboard, tack board, and a file for indexed visual-aid materials should be provided. A 16 mm. projector, opaque slide projectors, adjustable table, and a portable wall screen are necessary equipment. The sound cable should be built in. Dark shades or preferably dark slide drapes should be provided.

In larger school plants each department should have at least one 16 mm. projector, one opaque slide projector, and one roll-away carrier. One classroom of each department should be equipped with a built-in sound track and dark sliding drapes or dark shades so that students can use the projector as a part of their study program. Sliding drapes are very satisfactory because of the speed and simplicity of their operation and their acoustical effect.

Science Rooms

Flat-topped desks should be provided in the *biology*, *physics*, and *general science* rooms. The chairs should be strong and comfortable. Bookshelves or bookcases, a magazine or bulletin rack, a chalkboard, and a tack board are recommended. Storage space should be built in if possible, and suitable charts should be provided. Opaque slide projectors and dark slide drapes are recommended.

The *biology* department should have thermometer, barometer, aquarium, and terrarium. A large covered refuse jar is necessary, as also are specimen cases and an experimental table.

The *physics* department should have one board compass and one meter stick for every five children. If possible, the physics department should be near the workshop (if there is one) and should have a dark room.

The *chemistry* tables should be long, and stools should be used instead of chairs. Gas hoods should be provided. All waste jars should be of stone. Suitable charts, including an up-to-date periodic table, should be included. A portable rubber-tired supply carrier would be of great service.

All chemistry teachers' desks, when possible, should be equipped with electricty, gas, and running water.

The *general science room* should have a larger number of specimen cases than the other rooms, and a display table would help.

Other Special Areas and Laboratories

The areas listed below are all important to a well-rounded school program, and all present special detailed equipment problems. In both remodeling and construction of new buildings, it is recommended that the services of specialists in each respective field be consulted in the early planning stage. Such services are available in the State Department of Education and in several of the parish school Boards. However, in most cases, there will be unique local problems which will need recognition and adjustment to the particular situation.

- Fine and Industrial Arts Laboratories
- Music Areas
- Commercial and Business Laboratories
- Vocational Agriculture Areas
- Physics and Chemistry Laboratories
- Health and Physical Education Areas
- Homemaking Laboratories
- Library Areas
- Infirmary Rooms
- Central Office Suite
- Lunchroom

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General

1. *Guide for Planning School Plants*
2. *American School Buildings*
3. *Planning Secondary School Buildings*

Specific

1. "A Guide for Industrial Arts Shop Planning," Ohio Department of Education, Columbus, Ohio, 1949. 37 pp.

CHAPTER VII

Minimum Recommendations for Shelters in Schools

When properly programmed the provisions of dual-use shelter areas within a school plant may be accomplished with a minimum of cost and a minimum of conflict with the normal operation of the school. When the provision of such shelter spaces is contemplated, areas within the school which could serve both as shelters and in their normal capacity (i.e. cafeterias, libraries, classrooms, etc.) should incorporate protective features. Architects and engineers qualified as shelter analysts by the Office of Civil Defense should be used in developing original design concepts. A directory of analysts is available from civil defense offices. Primary attention should be given to protection against gamma radiation (fallout protection). Blast considerations are subject to the discretion of local school authorities.

Terminology

Fallout Shelters: A structure, room or space designed to protect its occupants from fallout gamma radiation, and provide a protection factor of at least 100.

Protection Factor: A factor used to express the relation between the amount of fallout gamma radiation that would be received by an unprotected person and the amount received by one in a shelter. (For example, an unprotected person would be exposed to 100 times more radiation than a person inside a shelter when the protection factor is 100).

Blast-resistant Shelter: A shelter meeting the requirements of a Fallout Shelter and designed to protect its occupants against the effects of blast, and associated initial nuclear and thermal radiation, for a design overpressure of at least 25 pounds per square inch.

Limited Blast-resistant Shelter: A shelter meeting the requirements of a Fallout Shelter and designed to protect its occupants against the effects of blast, and associated initial nuclear and thermal radiation, for a design overpressure of at least 5 pounds per square inch.

Dual-purpose Shelter: A shelter having a normal use which would not appreciably interfere with its use in emergency.

Space and Ventilation Requirements

Provision shall be made to prevent the build-up of vitiated air in shelter to a level hazardous to its occupants during the design period of occupancy.

At least 10 square feet of shelter floor area per person should be provided.

At least 65 cubic feet of space per person should be provided.

If the shelter capacity is based on minimum space requirements, then at least three cubic feet of fresh air per minute per person are required.

When ventilation is limited, the following table can be used for determining the relation of space requirements to ventilation:

Rate of air change (minutes)[*]	Volume of space required per person (Cu.Ft.)
1,000 or more	500[†]
600	450
400	400
200	300
100	200
60	150
35	100
22	65

[*] Computed as the ratio: $\frac{\text{Net volume of space (cu. ft.)}}{\text{Fresh air supply (cfm)}}$

[†] Shelter capacity or occupancy time may be limited by the volume of the room and not by its area. This is particularly true if mechanical ventilation is inadequate. In many cases, however, interior stairwells, shafts, and ducts would create enough natural ventilation to permit a continuous occupancy for at least three (3) days.

Filters are required on mechanical ventilation systems. They should be capable of removing at least 90% of 50 micron particles.

Construction Requirements

At least one unit of access and egress width should be provided for every 200 shelter occupants (a unit width is 22 inches, the space required for free travel of one aisle of persons). In no case shall the width be less than 24 inches; nor shall there be less than two widely separated means of egress from each shelter area. Emergency-type hatchways may be used as a means of egress. They shall be designed so that any normal-size adult can readily enter or leave the main shelter chamber.

Shelters offering resistance to blast shall not use construction materials that are of frangible nature. The use of these materials in fallout shelters is discouraged.

The interior surfaces of shelters offering resistance to blast, which are susceptible to dusting, shall be painted, coated, or otherwise treated to eliminate this possibility.

Shelters offering resistance to blast should not have false ceilings, loosely-supported fixtures or other elements (such as open storage shelves) likely to create flying debris in the event of shock. The use of such items in fallout shelters is discouraged.

Hazardous utility lines such as steam, gas, etc., should not be located in or near the shelter area unless provision is made to shut off lines before the shelter is occupied.

Appropriate provisions should be made for use of ordinary battery-operated radios. This may require installation of suitably designed antenna.

Fire Resistance

All shelters should be constructed to minimize the danger of fire from both external and internal sources.

Exterior surfaces of shelters offering resistance to blast shall not be ignitable by the thermal pulse associated with the range of the design over pressure. This shall be determined by methods approved by the Office of Civil Defense.

Shelters offering resistance to blast and, when feasible, fallout shelters with entranceways to existing buildings should be provided with closures which will heat-isolate the shelter chamber from the associated building. These closures shall also prevent the infiltration of noxious gases.

Shelters offering resistance to blast and, when feasible, fallout shelters should have air-intake systems located to minimize the chances of heated air or noxious gases from outside fires being drawn into the system.

Radiation Shielding

The protection factor of a fallout shelter shall be determined by a shelter analyst qualified by the Office of Civil Defense.

In shelters offering resistance to blast, the shielding required to adequately reduce the initial gamma and neutron radiation shall be calculated at the range of the design overpressure, using methods approved by the Office of Civil Defense. Using these methods, the inside dose from initial radiation shall not exceed 20 rad.

If filters or plenum chambers or other areas where radioactive particles can accumulate are in or adjacent to a shelter area, they shall be properly shielded.

In the calculation of the protection factor, the radiation dose contribution to the shelter occupants coming from the entranceways, ventilation ducts or other openings in the shelter's barriers shall be considered.

Entranceways shall be properly designed to prevent the infiltration of fallout particles and to reduce the fallout gamma radiation hazard through the use of principles of geometry and/or barrier shielding.

Blast Resistance

The blast resistance of a shelter and its components shall be calculated by methods recommended by the Office of Civil Defense.

Shelters offering resistance to blast shall be capable of withstanding the design overpressure without structural collapse or serious injury to the occupants. The equipment associated with the shelter such as vent pipes, doors, storage tanks, ductwork and other blast-sensitive items shall be designed to perform satisfactorily at the same overpressure range.

In shelters offering resistance to blast, openings to the atmosphere shall be provided with appropriate devices to prevent a build-up of pressure within the shelter so that its occupants are subject to no greater than 5 psi. Care shall be taken to assure that duct systems and other blast-sensitive items are properly protected.

Services

General provisions shall be made for the storage of basic shelter supplies by allotting at least one and one-half cubic feet per person. These supplies may include such items as water, sanitary kits, medical kit, radiation meter and food.

Water Supply

Approved disposable water containers, a suitable well or water storage tank shall be provided to assure an adequate potable water supply of at least 3½ gallons per occupant. Water storage containers should be non-fragible.

In fallout shelters, stored water shall be kept in the shelter itself or readily accessible to the shelter.

In shelters offering resistance to blast, stored water shall be either (a) kept in suitable containers within the protected area, or (b) kept in containers outside the shelter, in which case storage tanks and associated piping shall be able to sustain the design overpressure without leakage.

Sanitation

Provisions shall be made for the disposal of garbage, trash, and human waste in such a way as to preclude the creation of unsanitary conditions or offensive odors.

Regular or austere flush-type toilets, chemical or disposable toilets shall be available on the basis of one per 25 occupants. In fallout shelters, 50% of these may be outside the shelter area, if readily available in other parts of the building.

Electrical

Fallout shelters may not require emergency power if it can reasonably be assumed that regular power supplies will be available under fallout conditions.

Blast shelters should have emergency power.

Emergency power shall be adequate to operate at least the following systems:

(a) Required ventilation.

(b) Required lighting.

(c) Emergency water supply (when provided).

(d) Emergency sewage ejection (when provided).

Emergency engine-generator sets shall have separate vents and be heat-isolated from the main shelter chamber. Special consideration must be given to the manner of installation of engine-generator sets and fuel tanks to minimize hazards from exhaust gases and fires.

Emergency engine-generator sets shall have a storage tank for fuel supply of at least 2 weeks. In blast shelters, engine-generator sets and auxiliary equipment must be designed to perform in accordance with paragraph on blast resistance.

Emergency lighting levels should be as follows:

(a) Sleeping areas (floor level) — 2 footcandles.

(b) Activity areas (floor level) — 5 footcandles.

(c) Administrative and medical areas (desk level) — 20 footcandles.

Normal use circuits may be modified by appropriate switching in order to meet the above requirements, and allow use of normal power sources when they are available.

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